THE

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THE

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(J. A. BERLY'S).

1908 EDITION

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THE BRITISH ELECTRICAL INDUSTRY.

IN his presidential address last week, Mr. W. M. Mordey made a striking departure from the beaten track, with results of lasting value. The President's ardent patriotism is well known and justly admired, and this is by no means the first time that he has boldly joined issue with those who delight in depreciating their country and her sons. Long may his voice be heard in this most honourable cause!

It must be admitted at once that within the limits of its application, Mr. Mordey's proposition is established satisfactorily by the facts and figures which he brings forward in support of it. Clearly, so far as the electrical industry is represented by the great branches of electricity supply and electric traction, and so far as these are judged by the criteria of cheapness and popular appreciation as shown by the consumption per head of population, we are, in Mr. Mordey's words, "ahead—and well ahead." He did not touch explicitly upon the question of quality of service, or its availability to the public in general, though these are very important matters; but we believe that in these respects also we are at least abreast of our foreign *confrères*. If the use of overhead wires were more freely permitted in this country, as it is abroad, the argument would tell still more strongly in our favour.

The method adopted by the author in selecting samples may, perhaps, be criticised; but to have dealt with the bulk was obviously impossible, and the process chosen for obtaining a fair average was, no doubt, as Prof. Kapp remarked, scientifically correct. The fact that Prof. Kapp, with his intimate knowledge of the conditions obtaining in Germany, corroborated Mr. Mordey's conclusions is further and weighty evidence in favour of their accuracy.

And yet we cannot help doubting whether the last word has been said; whether there is really nothing rotten in the state of the electrical industry in this country. Granted that the public in general have no just grounds for complaint against the electrical profession; but does Mr. Mordey's whitewash adorn a sepulchre? There is reason to suspect that the British electrical industry is in by no means the prosperous internal condition that might be expected to accompany so fair an exterior. Competition of the cut-throat order is the rule, capital is scarce, manufacturing profits are a vanishing quantity—often, indeed, of minus sign—and while there appears to be a good deal of work in hand, it is of little benefit to shareholders, at all events.

The grinding pressure, never relieved, of trying to avoid a loss prohibits our electrical firms from carrying out those splendid researches which have given to the world the Nernst, the tantalum and the tungsten lamps; we cannot carry out experiments on high-speed electric traction on a gigantic scale; for single-phase railway motors we had to go abroad, though years ago Atkinson laid the foundation for their development. Apart from the "practical appli-

cations" especially dealt with by Mr. Mordey, are we really ahead, or are we second—or third—in the race of technical progress?

Again, as regards technical education—granted that we can build machinery and apparatus as good as the best—who designs them for us? Look around, and study the names of the designers—how many of them are British? Read the prefaces of many of the standard text-books: "The use of advanced mathematics has been avoided as far as possible"—why? Because the use of mathematics is detrimental?—or, because the English reader doesn't understand it?

Mr. Mordey proved his case; but it was only a section of the question. We are not of those who would decry their country; but we deprecate the holding of too optimistic a view, which would blind us to our true shortcomings and prevent their remedy.

LONDON POWER SUPPLY.

It would be difficult to find a more typical example of English methods, or at least of English Parliamentary methods, than this London Power Controversy. It would require the pen of some satirist like the real and inimitable Mr. Dooley to really do it justice.

In the first place, when commercial electric lighting was beginning, Parliament entirely failed to grasp the possibility of the great subsequent developments which have taken place, either in the size of area or of generating stations, or in the number of changes in the methods of production, or in the uses of electricity for other purposes than lighting. Hence it specified that the parish should be the unit of area, and the parochial authority the present, or indeed future, "undertaker."

This was quite enough to hinder electricity supply from growing to its proper proportions even in the provinces. But in London, where even a Government department might have been expected to foresee the possibilities of growth, it was far worse. This neglect has resulted in millions of the ratepayers' money, or money for whose repayment the ratepayers are responsible, being sunk in generating stations, which have now become in part obsolete and are badly placed. What is more, the special conditions of London rendered the obsolescence of these stations more rapid than that of works in the provinces. But so far from realising this were the higher authorities, and especially the London County Council, that they allowed many of these borough councils to raise electric lighting loans for 42 years, while those in the provinces are mostly limited to 30 years. Being possessed of rigidly guarded monopolies, the boroughs had little incentive to real progress, and it is, indeed, surprising how comparatively good some of the results they have obtained have been.

The companies, on the other hand, were subject to competition in the interest of the consumers, and to ensure its permanence, "association," carrying with it the right of bulk supply, was prevented.

By the end of last century the evils of "parochial" legislation were dimly realised, and the power companies with their large areas were authorised. But here, again, so much attention was paid to the rights of municipal monopoly, that the power companies' record has, except in the brilliant exception of the North-East Coast companies, been a failure.

That the London electricity business was in a muddle began to dawn upon the L.C.C. about 1902, and in that year began a series of attempts on its part to become the controlling power. The L.C.C. Bills of 1902 and 1903 promoted with this end in view, failed, as did the East London and Lower Thames Co.'s Bill of 1904. In 1905 the Administrative Co. came forward with the first serious proposal for the purpose of making a start with the consolidation of London electric supply. The L.C.C. was unable to prevent it passing Committee, but it prevented it reaching a Third Reading. In 1906 and 1907 it failed to get similar powers for itself. Hence in 1908 it has supported private enterprise in the shape of the London and District Electricity Supply Bill, which has now been rejected on financial grounds. Any attempt to solve the problem with insufficient financial backing would have been regrettable in the interests of electrical work generally, and the financial evidence put forward by the promoters was certainly very slight compared with that put forward by the Administrative Co., with its 63 promoters and strong City backing.

The question is What next? It is believed by some that the linking-up proposals of the companies, useful and legitimate as they are, are not sufficiently radical to do all that is required. But neither private enterprise nor the present L.C.C. is likely to tackle the problem again in a hurry. As a matter of fact, everybody, save the lawyers and promoters, is thoroughly weary of the entire business; and if the existing companies and municipalities are granted powers for linking up, &c., to enable them to meet the needs of the position efficiently, they will have received only what is their just reward.

Perhaps the idea of an Electricity Board, which some have advocated, may yet receive further attention; but whatever results, one cannot say that party government cuts a particularly good figure as regards its handling of commercial matters; electricity especially seems to suffer from it.

The Economical Life of Car Motors.

It is safe to say that the majority of the motors which were put into service 12 to 15 years ago, when electric traction really began to supersede steam and horse traction, are still in use. Certain of those earlier electric lines have not expanded greatly since then, and the old motors are much in evidence, but others of those pioneers have built so many more miles of track, and are operating so many more cars, that the original equipment has retired more or less from notice. Generally the old 8 or 12 miles per hour motors have been rewound for higher speeds, but in a few instances the cars continue to run at the old jog.

The maintenance charges on these motors have been, in most cases, a serious addition to the running expenses, and their addiction to failure has added to the troubles of traffic managers, and has entailed a not inconsiderable loss of revenue due to dislocated services and lost mileage.

The first of the totally enclosed motors which were used at all largely in England did excellent work under appalling conditions, and they continue to serve their owners, but it is for those owners to consider whether the time is not ripe, and more than ripe, for the replacement of their old servants by new and more efficient ones.

Last year an American tramway replaced a large number of 15-year old motors with new and larger ones at a cost of £77,000, and in the first 12 months the cost of motor maintenance was reduced by an amount equivalent to 12½ per cent. on the capital sum, while it is estimated that a further saving of £950 per annum is made on account of the reduction of failures in service. This may be an extreme case, as it is notorious that the equipments of some American tramways have been run into a moribund condition owing to the starvation of the maintenance department, but there is really no reason to think so in this particular instance. Nothing is said about reduction of running expenses or increase of revenue resulting from the introduction of more powerful motors, so that it is possible the headway was already as short, and the average speed as high, as the local conditions admitted, but there are English systems upon which a corresponding change would enable one or both of the above advantages to be gained.

The Rating of Tramway Motors.

It has been usual to give a traction motor a one-hour rating, and that is a practice which past experience has evoked and confirmed, but we are face to face with new conditions which call for a heavier rating. The T. & L.R.A. Brake Report gives the impression that electric braking for service stops may be inexpedient upon certain lines because the motors have as much as they can do to drive the cars, and would exceed the permissible temperature to a dangerous degree if they were called upon to furnish power for braking too.

It is evident, on the other hand, that electric braking in some form is the most desirable from the point of view necessarily taken by the Committee, that is to say, the point of view of public safety, and the obvious deduction is that the motors must be made big enough to deal with their new work. The hourly rating is over-scant for heavy lines, and unduly large for flat country, but it worked out well on the average until the recent growth of the electromagnetic track brake altered the conditions.

Electric braking in some form has been a feature of almost every British tramcar. At the outset it took the form of an emergency brake solely consisting of a sudden short-circuiting of the motors upon themselves. Later this was followed by the rheostatic brake, which in most cases came to be regarded as a graduated emergency brake, and was used for service stops or for coasting but rarely. The next step, upon which we rest at present, brought us to the magnetic slipper brake in place of the wasteful rheostat; but the evolution produced no corresponding impression upon motor design. Certainly the modern tramway motor is two or three times as powerful as the old Walker, or G.E., or Westinghouse, but that is due entirely to the greater speeds and weights, and electric brake duty has been imposed upon motors which have already enough to do to climb steep hills at speeds which would have sufficed for level running not long ago.

If the brake reports are to bear fruit in a reasonable time, strong recommendations, followed up, if necessary, by severe pressure, must be made to all owners of cars, which, in the opinion of those most competent to judge, are not provided with proper brakes, and as there is every reason to suppose that an electric service brake will form part of a "proper equipment," due provision will have to be made in the shape of motors capable of their full-load output for a period of at least two hours.

It is desirable that the subject which we have broached should be made matter for careful investigation and report by some authoritative body.

Scientific Publication.

Attention has occasionally been drawn to the difficulty of following the results of scientific investigation commonly experienced by those who find it necessary to keep abreast of advances in some special field of knowledge. The fundamental difficulty lies really in the number of societies dealing with different, yet necessarily overlapping, divisions of the same science; each of them publishes original papers by its members, the result being that, to read up the current work on any subject, one must wade through piles of magazines, a feat impossible to the busy technical expert. The trouble is aggravated by the fact that authors publish instalments of their work in different journals, so that he who desires to follow the course of an investigation never can be certain that he has not missed something, perchance of importance.

In an article discussing the wisdom of the formation of two new technical societies in America, our contemporary, *Engineering*, remarks on the heavy strain on the finances of many of the smaller scientific and technical societies occasioned by the publication of their own *Transactions* or *Proceedings*, and suggests that they "might prosper as departments of a great physical or industrial institute."

In regard to the question of publication, this is undoubtedly a sound position, but we cannot agree with the writer of the article in deprecating the multiplication of such societies *per se*. Each society, big or little, forms a centre of scientific life and activity, the value of which consists largely in the opportunities afforded to the many of occupying official positions, and acquiring experience in the conduct of affairs. This value would be seriously diminished were these societies to form merely departments of a greater organisation.

There is no doubt that one of the chief difficulties met with by the smaller societies is financial, that their expenses are much greater than those of the larger societies in proportion to membership, and that a great deal of the expense is entailed by their publications. A correspondent suggests that this strain might well be eased if, whilst the societies remained individual societies, each with its own organisation, they were to unite in the publication of one journal, which could be supported by contributions from each society *pro rata*. The councils of societies would still be responsible for the recommendation of papers for publication, the general policy of the journal being controlled by a representative committee.

Such an arrangement, he thinks, would advantage both scientific authors and their public. The former would command a wider field of influence, whilst the latter would gain in having the current literature assembled, and in avoiding the encumbrance of their shelves not only, as is too often the case, with duplications of original papers, but also with abstracts of the same papers, and, at the same time, of papers appearing in foreign journals.

There are, doubtless, many difficulties, financial and otherwise, in the way of such a scheme. Similar ideas have already been put forward by many sufferers from the existing state of confusion, but, until public opinion expresses itself sufficiently strongly to force a definite movement, nothing will be done.

To Buy or to Generate?

The *Electric Railway Journal* of America suggests that small tramway undertakings would do well in many cases to purchase energy rather than to erect power stations of their own. The example given is an interurban road 12 miles long running a half-hourly service at 12 M.P.H. average speed, and requiring four cars for the normal service. After making provision for special services, the total capacity of the station would be about 300 KW., costing somewhere near £9,000. The load factor of such a station would be poor, and the daily output about 1,800 units. The day would be 20 hours long, and a double shift would be necessary, the daily cost of labour and superintendence being put at about 36s.

Coal at 12 lb. per unit adds another 77s., and 12 per cent. for interest and depreciation 60s. more. The total daily cost would come to about 184s., which represents 1·22d. per unit. Some roads of a similar order are purchasing energy as low as ½d. per unit.

Now the figure of 1·22d. per unit seems to us in England so favourable that we could not expect to buy at a much more favourable rate for a small tramway. The load given by a half hourly service of heavy cars is not one to be coveted greatly by a central station, which supplies light as well as power, and, as a general thing, the supply company would have to lay down special plant for the tramway demand, probably in the shape of motor-generators.

The writer in the *Electric Railway Journal* is contemplating the use of a steam-driven station, but better results might be obtained if suction gas plant, or, better still, Diesel engines, were substituted for the steam engines.

Even in those cases where there is a reasonable certainty of self-generated power being cheaper than bought power, we hold that a small undertaking will be wiser to purchase energy and relieve itself of the heavy responsibilities of its own power station, unless the margin amounts to a considerable annual sum, which is hardly likely to be the case if the adjacent supply authority is up to its work.

D

THE PRESENT POSITION OF THE VARIOUS TYPES OF INCANDESCENT LAMPS.*

With a view to determining the present position of the newer types of incandescent lamps with regard to reliability, economy, length of useful life, &c., Prof. W. Wedding has carried out an exhaustive test at Charlottenburg on some

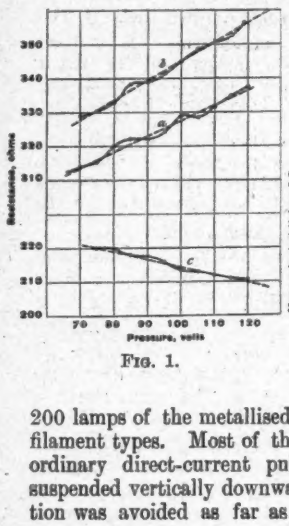

Fig. 1.

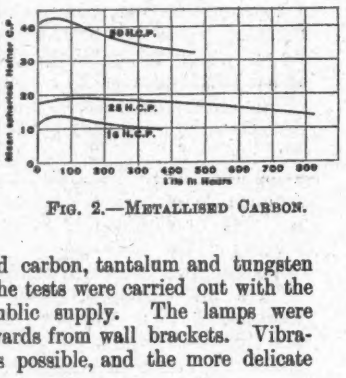

Fig. 2.—Metallised Carbon.

200 lamps of the metallised carbon, tantalum and tungsten filament types. Most of the tests were carried out with the ordinary direct-current public supply. The lamps were suspended vertically downwards from wall brackets. Vibration was avoided as far as possible, and the more delicate

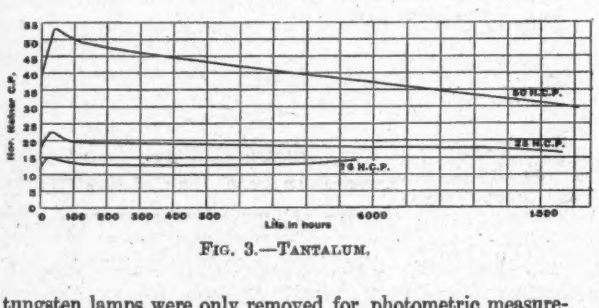

Fig. 3.—Tantalum.

tungsten lamps were only removed for photometric measurement every few hundred hours, so as to lessen the chance of breakage. Most of the light measurements were made in an Ulbricht globe photometer, 1 m. in diameter, though the spherical candle-powers obtained in this way were often compared with the horizontal candle-powers measured in two

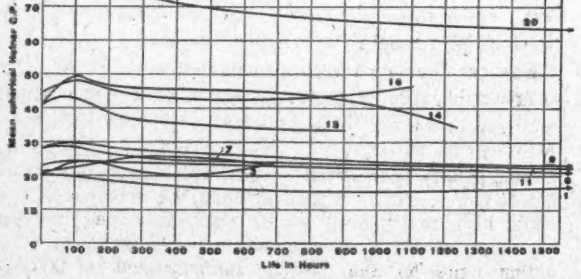

Fig. 4.—Tungsten.

diametrically opposite directions, since this latter is still the more usual figure dealt with commercially. The lamps tested included the following :—

Metallised carbon lamps : Ten 16-c.p. 107 volts, ten 50-c.p. 110 volts, ten 25-c.p. 110 volts. All made by the Allgemeine Elektricitäts Gesellschaft.

Abstract of paper read before the Verband Deutscher Elektrotechniker at Erfurt, 1908, by W. Wedding.

Tantalum lamps : Twelve 16-c.p., twelve 25-c.p., and five 50-c.p. 110-volt lamps. Made by Siemens & Halske.

Tungsten lamps : 49 lamps of 25 c.p., 36 lamps of 32 c.p., 54 lamps of 50 c.p., and eight lamps of 100 c.p.—some being for 220 volts, but most for 110 volts. They came from the following firms : A.E.G., Bayerische Glühfädenfabrik, Deutsche Gasglühlicht A.-G., Gebrüder Pinttsch, and the Zirconglühlampenfabrik, but the author is not at liberty to group these lamps under their makers' names.

The following table shows some of the results of the tests, the figures for each group of similar lamps of the same make being averaged :—

		Candle-power at start.		Watts consumed at start.	Watts per horizontal c.p.	Useful life in hours.	Average watt consumption.	No. of lamps tested.
		Horizontal Hefner c.p.	Spherical Hefner c.p.					
Metallised carbon filament.		16·8	13·34	35·14	2·09	322*	34·2	10
		52·9	40·2	102·9	1·95	434	100·7	10
		24·3	17·8	55·0	2·26	733	54·7	10
Tantalum filament.		15·1	11·6	26·1	1·73	867	27·3	12
		23·1	17·5	39·7	1·72	1,552	41·4	12
		51·0	38·4	86·6	1·69	1,685	85·7	5
Tungsten filament.	No.							
	1	26·3	20·0	—	1·07	1,651	27·8	8
	3	27·9	20·3	30·2	1·08	665	31·0	12
	6	28·5	22·8	36·1	1·27	1,819	36·0	10
	7	30·3	21·0	48·6	1·60	669	50·7	1 (220 V)
	9	35·3	28·7	40·0	1·14	1,217	38·9	10
	11	37·5	28·2	38·8	1·03	1,492	38·5	8
	14	54·2	40·8	58·7	1·08	1,014	61·1	12
	15	54·3	41·2	60·1	1·11	756	60·2	8
	16	55·8	44·5	67·9	1·22	1,111	66·9	4 (220 V)
	20	99·8	79·2	111·1	1·11	1,766	110·5	4
	21	116·5	97·5	126·6	1·09	413	124·1	4 (220 V)

* This short life is partly due to the lamps being 107-volt ones run on a 110-volt circuit.

The "useful life"—given in column 6—is taken to be the number of hours in which the candle-power falls off by 20 per cent., where such a falling-off takes place, but where, as in the case of most of the tungsten lamps, this 20 per cent. reduction is practically never reached, the "useful life" is taken as the average number of hours after which the filaments broke completely and could not be got to make connection again. In the paper the author also gives the average number of hours which elapsed before the first break of the filament (often remediable) occurred.

The behaviour of the various types of lamps is well represented by the author's curves. Thus fig. 1 shows the well-known difference in the temperature coefficient of metallised carbon filaments (curves *a* and *b*) and that of ordinary carbon filaments (curve *c*).

Fig. 2 shows the variation of spherical candle-power with time of burning for the metallised carbon-filament lamps ; fig. 3 shows the same relation for the tantalum lamps, and fig. 4 for a selection of the tungsten lamps.

Taking the normal carbon or tantalum lamp as a 16-c.p. one, and the normal tungsten lamp as a 25-c.p. one, it will be seen that the average consumptions are 34·2 watts, 27·3 watts, and 32 watts respectively in the three classes ; or for lamps of equal candle-power (25), the figures are 54·7, 41·4 and 32 watts.

The author considers that a new field is open to metal-filament lamps of high candle-power—viz., that hitherto occupied by small arc lamps. The question of 110-volt or 220-volt installations, he thinks, must still be left open, as the higher voltage metal-filament lamps may at any time become commercially successful even in small candle-powers.

"The King!"—On the occasion of the King's birthday, the management and workmen of the Ecco Battery and Electrical Co. forwarded their congratulations to his Majesty thereon, and received the following reply:—"Sandringham.—Please convey the King's thanks to the electricians and workpeople of the Ecco Battery and Electrical Co. for their loyal congratulations and good wishes.—Knollys."

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Branches v. Agencies.

"London Manager's" (who for short I will call "L.M.") letter certainly calls for an answer. To begin, let me congratulate him on evidently being a very exceptional official in a very unique company. I never before heard of works being appreciative of designs, or suggestions, from outside officials. Has "L.M." never asked for information from works, and not got it? Does "L.M." mean to say that if an inquiry came to a large manufacturer for a big supply of alternating meters, the equipment of a large printing establishment, or the turbo-electrical power installation for a mill, the branch manager alone would handle it? I think that both he, and I, know better than that. What are specialists, and meter, power and traction departments kept for at head office?

I never said a stock was not necessary. In some centres it is inevitable, but I did state that an agent can handle stock better than a branch manager, and I stick to it, because an agent only stocks what he can sell readily, as he only gets paid on what he sells. The rest is dead warehousing loss. A branch manager stocks what he fancies, but draws his salary all the same. Now here we meet the great difference between agencies and branches. The agent must sell to live, and the branch manager can please himself, within limits.

As to "L.M." blaming Free Trade for low salaries, I must disagree. The cause of low salaries is over-production. It is simply appalling the amount of trained and untrained men who are unable to obtain positions, and the low salaries which good men are willing to accept. As to his statement that an agent is no better off than a branch manager in the hands of an unscrupulous manufacturer, this is absurd. If an agent does not get fairly paid, he cancels his agency and goes on with his other business while he fixes up a fresh one. A branch manager, in these bad times, has to grin and bear it, or join the unemployed. I quite agree with "L.M." that an efficient, practical, technical, commercial engineer may do more business than a general agent. Certainly not twice or four times as much. I might point out that a business manager is not, and at his salary cannot be expected to be, an efficient, practical, technical, commercial engineer. He is, in fact, generally a trader without trading instincts, and his company suffers for his ignorance. The agent with five different agencies can employ more men than a branch with one, and that would level matters up. With regard to America, I can only advise "L.M.," next time he takes his summer holidays to take them over there. If he goes as an *impartial* observer, I am certain he will agree that the conditions are different, and essentially different, and that the difference is commercially successful. As to my second letter, I do not see that it matters what the electrical manufacturers think, or imagine, about business principles. That numbers should support a theory does not assure its soundness.

The game of "Follow my Leader," though an old one, is still played with the same zest. "A" opens a branch in Birmingham, "B," not to be left behind, opens one also, and "C," to get ahead, opens one too, and they all imagine they cannot afford to give them up. The real test of the question lies in the fact that the companies who have agencies seldom give them up for branches, and that agencies are increasing much more rapidly than branches, which shows they are more successful. I agree that my article was too short to properly set out all the terms of branch problems, but this was the fault of lack of space.

If I could have had room to discuss it fully, I could have made out a stronger case for agencies. I note that "L.M." claims my figures to be unreliable, and that was why I had to wait so long for his answer. This is one of my great objections to branches. We generally have to wait for everything, and the British public objects strongly to waiting. As to my figures, they are not only reliable, but they are real figures. I have given the actual returns obtained after some years of branch management with one of the largest and most pushing manufacturers in England. I was an agent's representative some ten years ago, and a branch manager and assistant branch manager for a considerable time. I am now an agent again. Whatever may be said of my deductions, my figures are absolutely correct, and the fact that "L.M." cannot realise this proves that he has little experience outside his own possibly successful London branch.

In conclusion, "L.M.," in his letter, seems to give his whole case away, as he states he would just as soon be an agent as a branch manager, provided the remuneration was the same. I fail completely to understand this point of view. If a branch is really all he states, I should have thought it would have been the last thing he would have said. If I might be allowed to offer him a tip, it is this: If "L.M." is the man he states he is, there is room for him in agency work. If he tries it, he will find that, instead of his sales falling to one-sixth with the increased scope, they are more likely to rise to double, and on this he will get fairly paid. The writer has had experience of both. As a branch manager he did well, and as an agent he found that his electrical turnover was rather increased, and an almost equal turnover in mechanical work was added. A man can only do a day's work in a day, and it is ridiculous to talk of a branch manager doing six times the sales of an agent. After carefully trying both, the writer would not—and could not afford to—leave agencies to go back to branches, even if he were offered such a heavenly place as "L.M." seems to enjoy.

Vilex.

A Powerful Station Staff.

As the efficiency of a maintenance staff is of paramount importance, may I ask if it is possible to improve on the following? In one of our most recent traction stations the maintenance department is run by the following officials:—

Maintenance engineer receiving £275 per annum.
Mechanical foreman (not a worker) £208 per annum.
Maintenance assistant engineer, duties not apparent, £162 10s. per annum.
Boiler house foreman (not working) £208 per annum.
Electrical foremen, duties also unknown, £156 per annum.

In addition to the above there are three engineers-in-charge, and a station superintendent whose duty it is to *instruct* maintenance department as to what requires doing. The objective consists of a plant about 14,000 KW. in four units. Of course, there are the usual workmen, in number about one to each official.

A capable superintendent, with the three engineers-in-charge, who, in fact, now have all the working and responsibility, could carry out such a job.

But retrenchment, though not affecting efficiency, would cut off many relatives from the benefit of ratepayers' cash.

Efficiency.

Electrical Driving in Cotton Mills.

May I make a few comments with reference to Mr. W. H. Booth's article on the above subject? An electrical plant is being installed in a large cotton mill near Manchester, and during alterations one weaving shed is being driven by motors aggregating about 450 H.P., and supplied from the town mains (not Manchester Corporation).

Since the start, three months ago, the supply has failed seven times, varying from two minutes to half-a-day, the total loss being about ten hours. In the same time two engines, nearly 40 years old, and together giving about 900 H.P., have lost one hour and a quarter. This kind of thing does not tend to popularise electrical driving, and, moreover, since the motors (synchronous) have been installed, there have been continual complaints from the weavers as to the unsteadiness of running. And this from a supply station in the very heart of the cotton towns near Manchester. The mill in question is an old one, and, in common with many similar Lancashire mills, is well adapted to electrical drive.

At present it is driven by three ancient engines, all widely separated, owing to the mill having been built up room by room as trade grew.

These will be replaced by motors where required, fed from one generator, and it is anticipated that considerable economies will result from such an arrangement. There is great scope in many of the older mills for an arrangement of this kind, since a direct drive from one engine is impossible, owing to the disposition of the buildings.

The mill manager naturally rates continuity of running very highly, and such stoppages as I have mentioned above do not tend to strengthen his opinion of electrical drives, particularly when he knows that with his own electrical plant he will have no standby in case of breakdown.

Erector.

The "Engineer" as Witness.

I notice in your current issue amongst your "Legal" reports, you mention the case of Lillico *v.* South Shields Corporation. During the course of this case, there was rather a humorous episode of which you may be interested to hear.

A witness was called for the prosecution, and the following was the cross-examination by the defendant's counsel ;—

Counsel: You are an engineer, I believe?—Witness: I have been an engineer, but I am at present an agent.

Counsel: You know something of speeds, I take it?—Yes.

Counsel: How far were you away when the car knocked down the man?—150 yards.

Counsel: What speed were you walking?—Three miles an hour.

Counsel: At what rate did the car pass you?—Whilst I was walking 10 yards the car had passed me and struck the man.

Counsel: Oh! So the car was going at 45 miles an hour?—Oh, well, hardly as fast as that.

Counsel: Well, but you said that the car was travelling 150 yards whilst you were walking 10 yards, and you were walking 3 miles an hour, therefore, the car must have been going 45 miles an hour?—Oh, I expect I was walking a little faster than 3 miles an hour.

Counsel: Oh!!!

H.

Which is the Rational Method of Stoking?

In reply to "Radix" in your paper of the 20th inst., I think it is very unfair for him to talk of mechanical stoking 25 years ago, when it was only in its infancy; what he should compare are the present-day methods.

I may say that in my 30 years' experience as engineer I have tried all the principal methods of machine firing; the various stokers have worked very well for a time, then comes the trouble and expense of repairs, which has been very large in some cases, especially where the boilers have been hard fired.

I have found, also, that when the stokers have been working about three or four years they have been very little better than hand-firing, because the machines have not covered the whole of the grate; therefore, the fireman has had to help with the shovel, and we all know what that means.

It is evident that "Radix" has a lot to learn about machine firing when he talks about blowing air into a self-cleaning fire-bar. It would be very interesting to know the difference between blowing and forcing air into a fire.

He then draws our attention to an advertisement, and says this is a very ancient system of hand-firing; I think he is sadly mistaken—the ancient system is firing up each side of the furnace.

The modern over-feed system is spreading coal evenly over the grate, each square foot of fire doing its full work and evaporation. I think, if he will take the pains to look up his modern method, he will find a big thick fire at the front, and none at the back; this is my experience, and it is also the reason why the fireman has to use the rake so often to level up his fires.

My opinion of mechanical stoking had been a very bad one until quite recently; I had made up my mind 12 months ago, to have nothing more to do with machine firing, as I had had so much trouble with them going wrong, but I am in the thick of it again with a new apparatus that I had fixed to a boiler a few months ago. So far, the machine has worked well, and has exceeded the makers' guarantees in every respect.

The price is rather a stiff figure, but the workmanship and material that have been put into this apparatus, and the work it will do, will amply repay any steam-user.

The first cost is nothing in any machine, providing it will pay good interest on the outlay, and continue to work with little repairs and give no trouble. I was hard to convince that this machine would be any different to the others I had tried, as every maker always says that his system is the best, and will advance tests to prove his case.

I never did believe in tests unless made by independent persons of good sound judgment, and for long periods, such as I am making with our new apparatus.

I do not wish, nor do I think it is fair to the Electrical Review, to give the maker a free advertisement; but I will, if "Radix" or any other reader wishes, give them the makers' name if they will send a stamped addressed envelope to my address, which the Editor can supply if wanted.

Engineer.

"Backward in Theory" wants to know if there is any means of gaining technical electrical knowledge in the district between Richmond and Kingston during the winter evenings. He thinks there may be advanced students willing to coach several evenings per week.

PROCEEDINGS OF INSTITUTIONS.

Some Comparisons of the Electrical Industry in this Country and Abroad.

(Abstract of Inaugural Address read before the Institution of Electrical Engineers, *London, November 19th,* 1908.)

By W. M. Mordey, M.Inst.C.E., President.

I have been urged by influential members of this Institution to devote my address to the consideration of the position of the electrical industry and of electrical supply in this country as compared with that in other countries.

My attention has been specially directed to some resolutions which were passed five years ago by a committee of engineers and business men prominently connected with electrical engineering.

The first resolution was as follows:—

"Notwithstanding that our countrymen have been among the first in inventive genius in electrical science, its development in the United Kingdom is in a backward condition as compared with other countries in respect of practical application to the industrial and social requirements of the nation."

I quote this resolution because it is typical of the opinion held then and now by a large number of people directly connected with electrical engineering, and because it also probably expresses the general opinion of the public. I am told there has been no improvement in the state of things referred to in those resolutions.

Various explanations are given—sometimes in considerable detail—of this supposed British backwardness. The favourite one is that our scientific and technical education, and our educational equipment, are defective and far behind some other countries. Another is that we are more hampered by legislative restrictions than other countries. A third, that our banks do not come forward to the support of industries as they are said to do in Germany.

The question we have to examine is a very simple one. Is it true, as the resolution states, that this country is: "In a backward condition as compared with other countries in respect of practical application to the industrial and social requirements of the nation"?

To answer this question it is, broadly speaking, only necessary, so far as the service to the public is concerned, to find the extent to which the systems of supply of electrical energy in different countries provide for the requirements of the public; or, in other words, to find the average consumption in units per inhabitant, and the average price per unit actually paid. I have prepared some tables giving this information for a large number of towns here and abroad.

Germany is the most important country for the purpose of the present comparison, for, so far as concerns European countries, it is Germany in particular that is referred to in the common statements about British backwardness.

The towns were selected in the following way. A list of the towns was arranged in order of their populations, ranging from 10,000 to 20,000 for the small towns and from 100,000 to 200,000 for the medium-sized towns. Then six towns were selected from each group, distributed uniformly according to population. For the group of large British towns—of more than 350,000 inhabitants—Glasgow and Bristol, the first and last of the list, were excluded in order to restrict the group to six towns.

The order of selection was in no way influenced by the electrical results—in fact, those results were not known at the time. Probably this method gives a fair average.

In the case of Germany, the list was made only of those towns for which the information was available. In the case of Berlin, no information is available except the consumption for lighting and power, the supply authorities not being willing to publish any figures as to revenue or average prices obtained.

TABLES A AND B (CONDENSED).—ELECTRIC SUPPLY STATISTICS FOR BRITISH AND GERMAN TOWNS (EXCLUDING TRAMWAYS).

Town.	Population in thousands.	Consumption in millions of units.			Units per inhabitant.			Average price per unit.			Revenue per inhabitant.			Per unit sold.		Total* cost per unit sold.	Gross profit.†
		Light.	Power.	Total.	Light.	Power.	Total.	Light.	Power.	Total.	Light.	Power.	Total.	Coal.	Wages, sal'ries, &c.*		
British.								d.	d.	d.	d.	d.	s. d.	d.	d.	d.	Per cent.
London—																	
Borough Councils ...	2,394	41·4	18·3	59·7	17·3	7·6	24·9	3·04	1·12	2·45	52·6	8·6	5 1	0·49	0·36	1·24	5·8
Companies	2,291	89·7	25·3	115·0	39·2	11·0	50·2	3·38	2·16	3 11	132·5	23·9	13 0½	0·48	0·52	1 42	6 7
Total or average ...	4,685	131·1	43·6	176 7	28·0	9·3	37 3	3·27	1·73	2·89	91·7	16·1	9 0	0·48	0·46	1·37	6 4
Six large towns, average	561	6 9	6·6	13 5	12 7	1z·2	24 9	3·22	1·00	2 13	41·0	12·3	4 5½	0 28	0·19	0·69	7·9
Six medium towns, aver'ge	134	1·2	2·0	3·2	9 2	15·0	24·2	3·30	0·92	1·83	30·3	13·9	3 8½	0 36	0·21	0·86	7·6
Six small towns, average	14·5	0·183	0·136	0·319	12·6	9·3	21·9	4·00	1·32	2·86	50·3	12 3	5 3	0·49	0 58	1·53	5·7
German.																	
Berlin C	2,592	41·0	53·7	94·7	15·8	20·7	36·6	—	—	—	—	—	—	—	—	—	—
S x large towns, average	546	4·2	2 9	7·1	7·68	5·27	1z·95	5 67	2·12	4 22	43 6	11·1	4 7	0·32	0·25	1·15	11·4
Cologne ... ... M	453	6·8	0 6	7·4	15·1	1·3	16·4	—	—	2·51	—	—	3 5	0·28	0·15	0·67	10 6
Six medium towns, aver'ge	148	1·1	2·4	3·5	7·30	16 40	23·70	4 62	1·44	2 43	33·7	23·6	4 9	0 38	0·22	0·83	11·1
Six small towns, average	14 9	0·179	0·114	0·292	12·00	7 66	19 66	5·27	2·02	4 01	63·3	15·4	6 7	0 82	0 56	1·92	9·3

* In addition to wages and salaries, this column contains management, office, legal, and insurance expenses in the case of British towns only.
† Gross profit = percentage on total capital expended, without deduction of interest and sinking fund. C = Company. M = Municipality.

TABLE C.—SUMMARY OF TABLES A AND B (LIGHTING AND POWER).

Towns.	Per inhabitant.		Per unit.							
	Units.	Revenue	Price.	Difference.		Coal.	Wages and salaries.	Coal plus wages, &c.	Difference.	Total costs.	Difference.
		s. d.	d.	d.	Per cent.	d.	d.	d.	d.	d.	d.
6 Large British	24·9	4 5½	2·13	2·09	98	0·28	0·19	0·47	0·10	0·09	0·46
6 Large German	12·9	4 7	4 22			0·32	0 25	0·57		1·15	
6 Medium British	24 2	3 8½	1 83	0·60	33	0·36	0·21	0·57	0·03	0·86	−0·03
6 Medium German	23 7	4 9	2·43			0·38	0 22	0·60		0 83	
6 Small British	21·9	5 3	2·86	1·15	40	0·49	0·58	1 07	0 31	1 53	0 39
6 Small German	19·7	6 7	4·01			0·82	0·56	1·38		1 92	

TABLE E.—ELECTRIC SUPPLY STATISTICS FOR VARIOUS FOREIGN AND COLONIAL TOWNS (EXCLUDING TRAMWAYS).

Town.		Popu't'n in thousands.	Consumption in millions of units.			Units per inhabitant.			Average price per unit.			Revenue per inhabitant.			Per unit sold.		Total cost per unit sold.	Gross profit.‖
			Light.	Power.	Total.	Light.	Power.	Total.	Light.	Power.	Total.	Light.	Power.	Total.	Coal.	Wages and sal'r's §		
									d.	d.	d.	d.	d.	s. d	d.	d.	d.	%
Paris	...C	2,750	—	—	42·00	—	—	15·30	—	—	5·67	—	—	7 2½	—	—	—	—
Lyons	...C	500	6·62	40·3	46·92	13·20	80·60	93·80	4·56	0·73	1·27	60·3	58·8	9 11	—	—	—	—
Bordeaux ...	...C	252	2 83	0·72	3·55	11·25	2 86	14·10	4·92	2·54	4·44	55 3	7 3	5 2½	—	—	—	—
Havre	...C	130	1 33	1·55	2·88	10·20	11·90	22·10	—	—	—	—	—	—	—	—	—	—
Grenoble ...	...M	74	1·90	2·20	4·10	25·70	29 70	55·40	2 50	0·65	1·51	64 3	19 3	6 11½	—	—	—	—
Zurich... ...	...M	178	1·69	2·06	3·75	9 50	11·60	21·10	5·38	1·66	3·34	51·1	19·3	5 10½	0·64*	0·45	1·00	10·1
Geneva ...	...M	126	2·99	7·64	10·63	23 70	60·60	84·30	4·67	0·45	1·64	110·7	27·3	11 6	— †	—	—	—
St. Gallen ...	...M	49	0 45	1·01	1 46	9·2	20 6	29 8	5 78	1·92	3 12	53 5	39 9	7 9½	0·31‡	0·26	0·98	10·1
Copenhagen ...	...M	440	5 05	2 08	7·13	11·50	4·72	16·22	4·43	1·98	3·72	50·8	9·3	5 0	0·31	0·28	0 90	17·2
Stockholm ...	...M	340	5 55	2·37	7·92	16·35	6 96	23·31	4·84	2·42	4 12	79·1	16 9	8 0	—	—	—	—
Kiev	...C	450	3·94	2 59	6 53	8 75	5·77	14·52	4·37	1·30	3 16	38 3	7·5	3 10	0·69	0·27	1 35	8 9
The Hague ...	...M	250	1·75	0 24	1 99	7·00	0·98	7·98	2·62	1·82	2·52	18·3	1·8	1 8	0·29	0·22	0·66	11·8
Rotterdam ...	...M	403	1 97	1·31	3·28	4·90	3·25	8·15	3·91	2 33	3·28	19·1	7·6	2 3	0·45	0·28	1·09	8·9
Brussels ...	...M	200	4 73	0·67	5·40	23 65	3·35	27·00	4·44	1·90	4·12	10 5	6·3	9 3	—	—	—	—
Chicago ...	...C	1,924	70 61	46·72	117·33	36·70	24 30	61·00	3·52	2·08	2 94	129·0	50·5	14 11	—	—	—	—
Melbourne ...	M & C	515	5·67	2 91	8·58	11 0	5·65	16·65	4·16	1·81	3 37	45·8	10 3	4 8	0·56	0·28	1·96	—
Adelaide ...	...C	173	1·00	0 65	1·65	5·8	3·76	9·56	5·00	2·34	3 96	29·0	8 8	3 2	0 90	0·41	2·18	—

C = Company. M = Municipality. * As about 83 per cent. of this energy is from water power, the coal per steam-generated unit costs 3·50d.
† Practically entirely water power. ‡ Partly water power—proportion not given. § This column contains wages and salaries only. ‖ Gross profit = Percentage on total capital expended without deduction of interest and sinking fund.

TABLES F & G (CONDENSED).—ELECTRIC TRAMWAY STATISTICS.

	Town.	Population served. Thousands.	Capital. Thousands.	Journeys. Millions.	Passenger revenue Thousands.	Miles. Track.	Car-miles. Thousands.	Costs. Thousands.	Per inhabitant.					Per passenger.		Per car-mile.	
									Capital.	Journeys.	Revenue.	Track-yards.	Car-miles.	Revenue.	Costs.	Revenue.	Costs.
	British.		£		£			£	£		s. d.			d.	d	d.	d.
	Six large towns, average ...	574	1,379	91·6	418	96	9 45	260	2·40	160	14 7	0·29	16·5	1·09	0·68	10 61	6·61
	Six medium towns, average ...	167	344	15 5	68·3	29 9	1,489	44·3	2·05	92	8 2	0·31	8·9	1·06	0·69	11 10	7·13
German	Berlin C	2,592	10,700	481·0	2,300	432	70,600	1,45	4·15	186	17 10	0·29	27·2	1·15	0·72	7 83	4·93
	Six large towns, average...	546	1,546	86·0	41z	111	1 165	264	2·83	157	15 1	0 36	27·8	1·15	0·74	6·52	4·18
	Cologne ... ... M	453	1,339	76·7	327	88·5	1 420	209	2 96	169	14 6	0·34	25·2	1·02	0·65	6·87	4·39
	Six medium towns, average	157	281	12 3	59 3	27·0	2,386	40·6	1·79	78	7 7	0·30	15·2	1·15	0 79	5·96	4 08

C = Company. M = Municipality.

TABLE J.—HIGHEST AND LOWEST AVERAGE PRICES PER UNIT. HIGHEST AND LOWEST AVERAGE UNITS PER INHABITANT.

	Average price per unit.						Units per inhabitant.					
	British (A).		German (B).		Other countries (E).		British (A).		German (B).		Other countries (E).	
		d.		d.		d.		d.		d.		d.
Highest lighting	Birkenhead	4·22	Hamburg ... / Plauen ...	6 5	St. Gallen	5 78	Manchester	18·4	Frankfort	14·4	Chicago ...	36·7
Lowest lighting	Sunderland	2·73	Aix-la-Chapelle	3·91	Grenoble ...	2·5	Belfast ...	5·3	Leipsig ...	3·65	Rotterdam	4·9
Highest power...	Plymouth...	2·1	Leipzig ...	2 93	Bordeaux ...	2·54	Sunderland	34·5	Mülhausen	33 2	Lyons ...	80·6
Lowest power...	Bolton ...	0·56	Mülhausen ...	0·93	Geneva ...	0·45	Plymouth	1·0	Leipsig ...	2 3	The Hague	0·98
Highest total ...	Birkenhead	3·7	Dresden ... / Hamburg ...	5·0	Paris ...	5·67	Manchester	46·8	Mülhausen	42·7	Lyons ...	93·8
Lowest total ...	Bolton ...	1·18	Mülhausen ...	1·61	Lyons ...	1·27	Belfast / Plymouth	8·8	Leipsig ...	5·95	The Hague	7·98

I have given Cologne separately, instead of including it in a group, as the information regarding it is incomplete in one respect. The Cologne authorities are unable to give the revenue and consumption for lighting and power separately, as they do not differentiate between light and power, energy for both being measured and charged on the same tariff by double-tariff meters, which change the price according to the time of day without apparently any reference to the purpose for which the energy is being used. This is a very logical system, for which there is much to be said. It was first proposed by Dr. Kapp. The price of energy in Cologne is the lowest of any of the large German towns.

An important column in Tables A and B is that showing the gross profit as a percentage on the total capital expended. This is very significant, in view of the fact that in both countries nearly all the systems examined are under municipal control. The larger gross profit in Germany indicates that the municipalities are taxing the consumers of electricity for the benefit of the rates.

In order to see to what extent the slightly higher price of coal in Germany affects the cost of production, the actual cost of coal per unit is given in detail in Tables A and B, which also show the wages and salaries costs, these being inserted to test the usual opinion that in Germany labour is cheap. The column headed "Wages and salaries" in A includes also management, office, legal and insurance charges; whereas in Table B it includes only wages and salaries, the information regarding management, office, legal and insurance charges not being obtainable from the German records.

In all three classes of towns labour is higher in Germany than here, which shows that low wages and long hours do not necessarily mean cheap labour. If the wages and salaries column in Table A had included as much as it does in Table B, the comparison would have been still more in our favour.

Capacity of Generating Stations.

Another comparison may prove interesting—that of the total power provided in Germany and Great Britain respectively for the public supply of electrical energy for lighting, power or traction. Table D gives this comparison, and provides a further proof that there is no foundation whatever for the common belief in British backwardness in electrical supply. Our generating stations contain 2¼ times as much power per inhabitant as those of Germany.

TABLE D.—Total Kilowatts of Generating Plant in Power Stations for Public Supply or for Tramways.

	Kilowatts.	Population.	Watts per inhabitant.
Great Britain ...	983,181	45,000,000	21·8
Germany	612,652	63,000,000	9·7

Table E contains information about a number of important towns in different parts of the world outside of Germany.

Although the conditions are in many cases so different from ours that any direct comparison is difficult, I hope the table may prove to be of interest. It shows that with the exception of a very few places which have ample and cheap water power the supply of electrical energy, and its cost to the public, does not compare favourably with ours.

It has been difficult to get information for this table, as there are no useful official or authoritative returns available for any countries but Great Britain and Germany.

In the United States there seems to be nothing available—my inquiries have produced no result, except for Chicago.

From Italy I have been able to get nothing.

The three Swiss towns—Zürich, Geneva, and St. Gallen—all have the advantage of water power. Zürich is mainly water power, with a long distance transmission, and St. Gallen is partly water power and partly steam. In these two places it will be observed that the average price is 75 per cent. higher than in the medium-sized British towns.

The power at Geneva is entirely water power, where, in addition to the ordinary electrical supply, there is a very large consumption—about 18,000,000 units—for electro-chemical work, which is not included in the tables. The average price to the public is 1·64d., or 10 per cent. less than the average of our medium-sized towns.

An appendix gives an analysis of the Geneva results, and shows that the capital charges allowed (viz., 6 per cent. interest and 1·2 per cent. sinking fund) amount to 0·23d. per unit, while the power itself only costs 0·07d. per unit, distribution being excluded in both cases.

Of the other large continental towns, with the exception of Lyons, all are higher in price—most of them very much higher in price—and appreciably lower in consumption than in our large or medium-sized towns.

Lyons has water-power and a very large industrial motor load. Its price for lighting is, however, high, and the consumption only about half as much as the average of our large towns. The power load is, however, the largest in the list. Grenoble—another town supplied from water-power—has also very high consumption both for power and lighting, and low prices.

The Chicago results are probably better than those of other American towns. The consumption per head is higher than in any European towns, except Geneva and Lyons. The average price for power is 2·08d., against 1·73d. in London, and 1·0d. in the large British towns. The price for light is 3·52d., as compared with 3·27d. in London, and 3·22d. in the large British towns. In considering these prices, it is necessary to bear in mind the lower value of money in the United States.

The figures for Melbourne and Adelaide show a satisfactory development of electric supply, and the prices charged are moderate in view of the low value of money in Australia.

Tables F and G contain information enabling a comparison to be made between two groups of British towns and two corresponding groups of German towns as regards tramways. It will be noticed that the differences between the two countries are much less than in the supply statistics.

The most striking difference between the two countries is in the car-miles per inhabitant—the German figures being nearly double the British for both groups of towns. This difference is, of course, due to the use of small cars in Germany. The average carrying capacity of the cars (including standing space, which is allowed in German practice) is 33 passengers; probably the average capacity of our cars would be about 50 passengers.

The cost per passenger—a very important quantity—is distinctly higher in Germany in both groups of towns, being 9 per cent. higher in the large towns and 14½ per cent. higher in the small ones.

The total cost per car-mile is lower than here. Low wages help in this. As only two attendants can be employed on each car, low wages and low cost of labour are synonymous.

The comparison of the ratios of costs to revenue is in favour of the British towns.

I do not suggest that these results are exhaustive, or that they cover the whole field, but I think they may at least be taken to show that the question we set out to examine may be answered in the negative—the question whether "the United Kingdom is in a backward condition, as compared with other countries, in respect of practical application to the industrial and social requirements of the nation."

As regards Germany, the Tables A, B, C and D show that we are far ahead of that country in the extent and cheapness of our supply industry. The relative position of the two countries as regards the supply of energy for public lighting, for domestic, and for industrial purposes may be summed up thus:—

1. In the large towns in Germany electrical energy costs twice as much per unit, and the consumption per inhabitant is half as much, as in our large towns. The difference in the cost of coal is insignificant, and does not account for the higher price. The labour there costs more than it does here.
2. In the medium-sized towns the price in Germany is 33 per cent. higher than here, and the consumption is about the same as in our medium-sized towns.
3. In the small towns in Germany the price is 40 per cent. higher and the consumption is about the same as here.
4. Our public generating stations contain two and a quarter times as much power per inhabitant of the whole country as those of Germany.
5. In electric tramway work we do not compare unfavourably.

As regards important towns in other countries, while the advantage of cheap and ample water power in a few places has enabled an extensive supply to be given at low prices—notably in Lyons, Geneva, and Grenoble—the lowest price in any town here tabulated is in a British town; Bolton, with its average of 1·18d. per unit, heads the list, Lyons being second with 1·27d. per unit. There is nothing in their electrical work to justify in any way the charges that have been so freely made against us. These depressing charges have not originated abroad; they are entirely of home production.

At the outset I referred to explanations given of our alleged backwardness. The backwardness does not exist; we are ahead and well ahead. I do not wish it to be thought, however, that there are no hindrances—legislative or otherwise—to our getting still further ahead. But, in my opinion, there is no more justification for the statements about our scientific and technical education being behind other countries, than for the statements about the backwardness of our electrical engineering. I resent very strongly the disparagement of the results achieved in this country by the band of teachers, eminent over the whole world, who have been responsible for the scientific and technical education of the engineers concerned in the development of our industry. Technical education should be judged, not by the wealth of the equipment of laboratories, but by the engineering results achieved in the country. I have tried to show you to-night some of those results.

Institution of Electrical Engineers—Glasgow Local Section.

At the opening meeting on the 10th inst., Mr. W. W. Lackie presided and delivered his inaugural address as chairman for the session. He pointed out that the supply of electrical energy in this country now employed a capital of 53½ millions sterling, with an annual revenue of £6,500,000. The electricity department of Glasgow last year sold 32,000,000 units to ordinary consumers, and a further 27,000,000 units were used by the tramways department for tramway purposes, or a total of 59,000,000 units, representing a revenue of £370,000. To transform this energy at least 50,000 h.p. of plant was required. The new regulations, if passed into law, would undoubtedly retard the use of electricity by large industrial consumers. The authorised electrical undertakings, both in and around Glasgow, were threatened with serious competition from what he could only describe as a pirate company, which, with no Parliamentary authority and without any provisional order, proposed to supply energy in areas allocated to companies and municipalities and defined by Act of Parliament or provisional order, to consumers who had premises adjacent to or abutting upon railway lines or other private ways. Supply companies could only hope that something would be done to prevent the railway people from allowing their wayleaves to be used in this manner. The pirate undertaking could pick and choose its consumers, whereas an authorised concern had to

supply practically all consumers in its area, and would be left with the less profitable and all the unprofitable consumers. Now that a more efficient lamp was an accomplished fact, the threatened danger of a decreased lighting load had given rise to the alarmist cry that they must increase prices. If each kilowatt of plant in an electricity works generated 8,760 units per annum, the load factor would be 100 per cent. The load factor looked at from this point of view, which was probably the most important one, was in practice something between 10 and 40 per cent. of the possible. Other load factors were regularly used and had a bearing on the running of the generating station. On a day in December when the demand for electrical energy in a commercial city like Glasgow was at its maximum, there would be something like 185,000 units generated, but there was plant available at the works to meet a demand of 24,000 KW., or 567,000 units could have been sent out if there had been a demand for this quantity equally spread over the 24 hours of the day. In August the maximum demand was only 6,300 KW. as against 22,000 KW. in December. On the average, for the year, the plant had only been called upon to send out 16·8 per cent. of the possible.

From tests made it had been found that a boiler having a heating area of 4,000 sq. ft. with its corresponding pipes and valves and fittings, to maintain a pressure of 200 lb. per sq. in., required 92 lb. of coal per hour while supplying no steam. If the boiler were allowed to cool down from 8 or 9 o'clock in the evening until it was required next day at 3 p.m., the coal required to set it away, would amount to 42,900 lb., and it would take some hours; it was more economical to bank it, if it was likely to be required within a period of 40 hours. With such a boiler supplying a lighting load, the amount of coal used per unit generated would be nearly 7 lb., while if it were on a power load under 3½ lb. would be consumed per unit generated: the cause of the discrepancy was the comparatively small amount of standby coal in proportion to the total used in the second case. Thus the cost of coal per unit for a power load would be less than half that for a lighting load. The proportion of time therefore during which a set ran at different loads would also have a direct effect on the coal consumption per unit. The load factor on the station, created by the aggregate demand of all the consumers added together, would be higher than the individual load factors of the majority of the consumers, and must be one of the main hopes that the public supplier had of being able to offer energy at a lower rate per unit than the individual consumer could generate for himself with a private plant.

The true diversity factor was the ratio of the maximum demand on the station to the sum of the maximum demands made by the consumers. This in the case of the lighting would amount to about 70 per cent. and in the case of the power-load to about 40 per cent. There could not be any relation between the diversity factor and the load factor on a lighting demand, although in a power supply there might be some ratio between these two factors. It was found in actual practice that 80 per cent. of the maximum demand of lighting consumers came on between 3 and 6 p.m. in the winter months only, whereas in the case of power supplies there was no such natural law.

The author gave a table showing the cost per H.P. per annum in some trades. The interesting figures to the supply station were those at the end. There were 3,583 motors connected to the Corporation mains as at May, 1908, and these were used for 113 different trades or purposes. The load factor on the station from these, worked out at 38 per cent. The load factor on the station would be approximately the same for all the trades, but the diversity factors would be widely different. The figure of £10 per H.P. of maximum demand on the station might be considered high; but the plant earning £3 13s. 4d. per H.P. from bakeries was again used during the day by engineers, &c., earning a further £6 9s., and while hoists (for instance) only gave £2 0s. 3d. per H.P. individually, the true diversity factor was of the order of 20 per cent., so that the revenue per H.P. of maximum demand on the station was 5 × £2 0s. 3d. or just over £10.

No. of consumers	Occupation.	Total H.P. for trade.	Load factor for trade.	Diversity factor H.P. of M.D. / H.P. installed	Revenue per H.P. of M.D.	Revenue per H.P. install'd.
36	Bakers	578	11%	62%	£3 13 4	£2 7 0
10	Bookbinders ...	30	12·2%	72%	5 2 0	3 13 0
60	Butchers ...	222	9%	58%	3 8 3	2 15 0
100	Clothing manfrs.	604	18%	66%	6 7 5	4 3 0
78	Engineers ...	2,563	23%	66%	6 9 0	4 6 0
77	Hoists	834	4·6%	100%	2 0 3	2 0 3
12	Ironworks ...	808	26%	55%	6 11 5	3 13 0
68	Printer & publ'r	1,328	11·5%	58%	4 8 0	2 12 0
Total on station.		On station.				
3,583	113 trades ...	23,748	38%	37%	£10 0 0	£2 16 0

$$\frac{\text{H.P. indiv. M.D.}}{\text{H.P. installed}} = 66\%, \quad \frac{\text{H.P. of M.D. on station}}{\text{H.P. installed}} = 25\%,$$

$$\frac{\text{H.P. of M.D. on station}}{\text{H.P. of indiv. M.D.}} = 37\%.$$

These figures give an excellent text for a paper on the cost of energy from a public supply, as compared with a private supply. There was no diversity factor in a private supply.

This was the principle underlying the maximum demand system of charging as used in Glasgow. It had frequently been said that this system was not a fair one, because it failed in certain cases to take into account the time at which the maximum demand occurred. This was not really the case. The maximum demand system took cognizance of the time when the maximum demand occurred, by reducing the charge to the whole of the consumers; it recognised the extent to which the aggregate maximum demand of all the consumers did not occur simultaneously, and the system was equitable and fair on account of that very fact.

It would manifestly be unfair to allocate the standing charges only to those consumers whose maximum demand occurred between 3.30 and 6 p.m., and let the other consumers off with works costs only. It might be possible still further to reduce the price for lighting considerably, if by a proper adjustment of the rates for power they could so increase the power day load as to be able to ignore in a large measure the greater cost of the lighting units.

In the supply of energy for lighting and power they had to meet two entirely different sets of conditions. They might look forward to the time when the total demand for lighting would be, say, only 10 per cent. of the total output, the other 90 per cent. being used for power and heating purposes, and electrical energy used for lighting purposes would then be thrown in at a price corresponding to their charge for power to-day. The effect of the metallic-filament lamp helped on this idea by reducing the present demand and corresponding consumpt of energy for lighting purposes.

In Glasgow the lighting demand, while it was still on the increase, was growing in a decreasing ratio as compared with the power demand, and next year it was anticipated that the power demand would exceed that for lighting. Adding the units used for tramway purposes to those used for power purposes last year, they found that 42,000,000 units were used for power purposes and 15,000,000 for lighting, or 26 per cent. of the total units generated were used for lighting.

Physical Society.

At the meeting held on November 13th, 1908, Dr. Fleming communicated a note on the Photo-electric Properties of Potassium-Sodium Alloy, illustrated by experiments. He described a mode of making a tube in which potassium and sodium could be melted together and then decanted over into a chamber containing a platinum plate, so that a mass of the liquid potassium-sodium alloy having a perfectly clean surface, and the platinum plate fixed above it in an inclined position, could be constructed. By means of platinum wires sealed through the glass tube, contact is made respectively with the platinum plate and the liquid alloy. When the surface of the alloy is illuminated by a powerful beam of light and the galvanometer connected to the platinum plate and alloy, it is found that a current is produced in this circuit merely by the action of the light, and by balancing this current against a variable electromotive force it was shown that an electromotive force varying from ·4 to ·8 of a volt is produced in the photo-electric cell, due to the action of the light.

It was shown that this photo-electric effect was greatly dependent on the colour of the light and especially upon light absorbed by the alloy. In all cases of such photo-electric action, the rays which are effective in producing it are those given out by the substance if heated or otherwise made radiant. Thus, zinc is photo-electric under the action of ultra-violet light, and ultra-violet light is largely radiated when an electric spark is taken between the zinc balls, or an electric arc between zinc poles. The photo-electric effects in the case of the potassium are probably due to the absorption of the violet ray emitted by potassium when heated.

Some points of interest in connection with radio-telegraphy were then discussed. It has been shown that perfectly dust-free air is not ionised by ultra-violet light. If, therefore, the absorption of radio-telegraphic electric waves, which is found to exist when they pass through long distances of sunlit air, is due to the presence of free ions in the air, this may arise from the photo-electric action of the light upon dust particles. This suggests the question whether these particles may not be the same which create the blue colour of the sky; and if these particles absorb ultra-violet light and thereby create ionisation, that would account for the relatively small percentage of ultra-violet light found in sunlight at the earth's surface, and also suggests the need for further observations on the ions present in the atmosphere at various heights.

A paper entitled "Electric Splashes on Photographic Plates" was read by Mr. Alfred W. Porter. The author showed by means of transparencies the effect of a normal magnetic field upon the patterns which appear on developing a photographic plate which is placed between two terminals, between which a discharge passes.

Mr. Porter also showed an experiment "On an Anomaly in the Lagging of Thin Wires and Narrow Pipes." When thin wires and narrow pipes are covered with a lagging material, it is not possible at once to say whether the covering will keep heat in or assist it to escape. There is a critical radius, equal to the ratio of the conductivity of the material to the emissivity from its surface, which the outer covering must exceed before it begins to act as a lagger. A thin platinum wire ('2 mm. radius) was coated at intervals along its length with glass of about ·2 mm. outer radius. When an electric current was passed through the wire, of sufficient strength to raise the uncoated portions to (say) 800° C., the coated portions did not even glow, and measurements showed that they remained at about 100° C.; there was thus a difference of about 700° on the wrong side. A thickness of coating can be obtained, which is such as to allow the same escape of heat as from a practically uncoated wire. To illustrate this two narrow steam-pipes were shown—one coated with a single layer of asbestos paper, the other with a very thick coat. The two were equivalent in their power of preventing escape of heat. An intermediate thickness of coat would have made a *worse-lagged* pipe than either of them.

THE MOTOR EXHIBITION AT OLYMPIA.

Motor exhibitions at the present day do not offer any outstanding features of electrical interest, and the one which closed on Saturday last was no exception to the rule.

But from the motorists' and general engineers' standpoint, the Exhibition was more than usually interesting. Such features as the so-called "valveless" engine, the Humphris gear and the several adaptations of epicyclic gearing as a substitute for the sliding speed-gears so generally adopted, also the two-stroke engine, represented welcome indications of progress.

In addition to the above, there was overwhelming evidence of a desire to popularise the small car—the two-seater—and while we are sure that success will attend such an effort, a feeling of disappointment remains that the electric runabout has not substantiated its claim to a similar share of popularity for short-distance travelling. The electrical car only figured on two stands, *i.e.*, No. 139, where the British Electromobile Co., Ltd., showed a 10-h.p. electric "Oppermann" landaulette, together with several petrol cars, and No. 1, where the Electrical Vehicle Co., Ltd., had on view a touring car fitted with Victoria body, and a phaeton.

The former was provided with 40 Tudor cells, 30 of them being carried under a bonnet—the familiar bonnet of the petrol car—and 10 at the rear of the car. A special type of traction battery is supplied by the Tudor Co., if necessary, under a five years' maintenance guarantee, for £25. The vehicle will run 80 to 100 miles on one charge, and it possesses the well-known feature of simple control, associated with all electrical vehicles.

The phaeton is fitted with a 30-cell battery, weighing some 8 cwt., and giving a travelling distance of 60 miles on one charge.

Now, admitting that the petrol engine rules the roost for propulsion purposes—for the steam-driven car was but little more in evidence than the electric vehicle—it is equally true that a magneto system in some form or other is the recognised ignition arrangement. The magneto and induction coil combination appeared to be a general favourite, occasionally with an accumulator stand-by; simple l.t. magneto systems were not much in evidence.

Somewhat of a novelty in this line was shown on the Ford cars, in which the conventional h.t. ignition with coil, magneto and alternative accumulators are fitted, and the magneto consists of a permanent-magnet rotor built up on the engine fly-wheel, and facing a series of stationary coils carried on the frame.

Among the exhibits which bore familiar names, may be mentioned the series of Westinghouse cars; the attractive display of the Adams Manufacturing Co.; and in the gallery, the sample castings shown by Messrs. Willans & Robinson, Ltd.; ball bearing specialities, by Messrs. Hoffmann and Ludw. Loewe; speedometers and indicators, by Messrs. Elliott Bros.; worm and other gears, by Messrs. David Brown & Sons; chains, by Hans Renold, Ltd.; ignition cells, coils, magnetos, flexibles, &c., by Messrs. Siemens Bros. & Co. Messrs. Longstreths, Ltd., Van Raden & Co., G. T. Riches, Peto & Radford, Ltd., and C. A. Vandervell were, as usual, prominent in ignition matters, principally accumulators, while the Simms Manufacturing Co., the Bosch Magneto Co., the Electric Ignition Co., and others specialised in magneto systems of ignition.

Miniature vulcanisers were shown on several stands; Messrs. Peto & Radford showed a handy little electrical apparatus for vulcanising cuts in covers without removal from the car-wheel. The device is worked from any 100 or 200-volt circuit, and maintains a steady temperature which prevents damage to the rubber. Messrs. Harvey, Frost & Co., Markt & Co., and the Rotax Co. were showing devices for a similar purpose.

The tire maker was naturally much in evidence, but the only novelty in this line was the K.T. tire, in which the wheel periphery is studded by two rows of cylindrical hollow rubber studs carried in a perforated rim fitting on to the wheel rim. It is claimed that the studs, owing to the air cushion inside them, are a good substitute for the ordinary pneumatic, and that they are an effective remedy for skidding.

On the whole, the Show was a very successful one, over 300 exhibitors taking part in it, a large proportion, of course, being exhibitors of accessories.

That the electrical vehicle was practically absent, is, to us, a matter of regret, tempered, however, by our firm belief that a good time is coming, not only for the "town" electric car, but also for electric transmission systems in general.

The simplicity of operation of the electric car renders it unrivalled in its own sphere, and as regards electric transmission, which may at first sight appear complex, one can safely say that that which it may supersede, *i.e.*, gear box, clutch and differential, is the crudest and most unsatisfactory part of the modern petrol car. We imagine that the American preference for epicylic gears, the prominence given by some home manufacturers to the same subject, and the evident wish to do away with the gear box altogether shown by some makers, and by others, to dispense with sliding gears, are ample evidence of this fact.

Indeed, when one comes to consider the much-used ignition system with its magneto, induction coil, accumulators, the electric head, tail and inside lamps, the oil and water pumps, cooling fans, &c., and the air pump and compressed air tank for starting purposes, which we noted on two cars this year, the adoption of petrol-electric transmission seems a small and even simple matter, especially on the large car.

It must not be thought that we depreciate the excellent mechanical work embodied in the modern system of car construction, but we confess to doubts as to the practical efficiency of that system—doubts which are not allayed by visits to the garages of the large 'bus and cab companies in the metropolis.

LEGAL.

Limerick Corporation *v.* Crompton & Co., Ltd.

At Dublin last week, before Mr. Justice Wright, Mr. Patrick Kelly applied for an order, on behalf of the plaintiffs, for leave to issue and serve a writ out of the jurisdiction upon the intended defendants, Crompton & Co., Ltd., of London. The action was intended to be brought for damages for delay in the execution of a contract to deliver and erect plant and machinery in Limerick for the purpose of lighting the city by electricity, and for loss sustained by reason of the delay, which loss was estimated at £1,300. Counsel applied under Order 11, Rule 1, Sub-sec F, which applies to contracts made within the jurisdiction. It appeared that the contract had been accepted by letter posted in Limerick, and the deed in which the contract was subsequently embodied was first executed in London by the intended defendants, and subsequently in Limerick it was executed by the Corporation, the intended plaintiffs, and delivered in Limerick. Counsel relied on the case of Hayes *v.* The Star Scottish Insurance Co., that the place of delivery was the determining factor in ascertaining the place where the contract was made; and therefore he contended that this contract was made in Limerick, and that it would be more convenient to have the trial in Ireland.

His Lordship made the order sought.—*Freeman's Journal.*

Lancashire Solicitor and the Wigan Tramways.

At Wigan, on Monday, last week, Mr. W. J. Lees, a local solicitor, was summoned by the Wigan Corporation for travelling on a tram car beyond the distance for which he had paid, without paying the additional money. Mr. Lees travelled by the 7 p.m. car from Wigan to Standish and tendered one penny for his fare. The conductor offered him a ticket which entitled him to ride to the first penny stage, but the defendant refused to have it, and urged that he was entitled to travel at workmen's rates. He gave the conductor his card, and suggested that the Corporation should summon him. A fine of 1s. and costs was imposed, and the Bench agreed to state a case for a superior court.

BUSINESS NOTES.

The Position of the Electrical Industries in Germany.—A correspondent writes:—"The *Berliner Boersen Courie* has received information from the A.E.G., the greatest electrical concern in Germany, as to the present position of the electrical industries in that country to the following effect:—

"Lastly, orders are placed much more reluctantly with the electrical industries than in the preceding year. Great dangers threaten German firms from different directions. In the first place is to be mentioned that the unfortunate foreign policy of the German Empire is making itself felt in a painful manner. For nearly half of their products the German electrical industries are dependent on export, and the difficulties which are being experienced in this direction just at present are enormous. Further dangers to the industries arise from the new Acts. The tax on companies will turn out to be much more cutting than is generally supposed. The main reason for this will be that, owing to the prevailing system of one company being a partner of another, and the latter of a third, and so on, it will come to pass that the tax is not only to be paid once, but two, three, or even four times. In this way the net profit of well-paying concerns will be curtailed not to the degree of 6 to 7 per cent., but very likely as much as 20 per cent., and this would mean the throttling of the business. Further, the tax on electricity, as proposed at present, would bring a tremendously heavy pressure to bear on the business. It would decrease the use of electrical energy in the lighting line, and direct it into other sources; it would injure the generating of electricity, and many crafts would be referred back to their old reserves which had been put on the shelf as being neither modern nor efficient. This Act, as well as the motor-car Act, which latter the other day was discussed in the Reichstag in a manner showing very little knowledge of the subject, will prove that instead of development our industries can only expect injury and discouragement from either the Government or the representatives of the people."

Platform Steps.—We are informed that an improved fold-up platform step has been made by Heathman's ladder factory, at Fulham, of extremely light weight and to fold very compactly. The platform at top is roomy for a man to stand upon and be free to use both his hands, while there are hand supports either side if he, in a moment of forgetfulness, wants something to clutch at.

New Lamp Factory at Rugby.—The Rugby Lamp Co., Ltd., has built a factory on the Lower Hillmorton Road, and has, says the *Rugby Advertiser*, in an unassuming way, already started the manufacture of incandescent electric lamps. The principal shareholders are Mr. T. Hunter, J.P., C.C., who is well-known locally, and Mr. James Findlay, who for about five years was in charge of the incandescent lamp department at the B.T.-H. works, and for 13 years previously was at the lamp works of the General Electric Co. in America. Mr. Findlay is superintending operations at the factory, where it is intended not only to specialise on the new metallic-filament electric lamps, but also to manufacture the old style of carbon-filament lamps. About 20 girls, accustomed to the work of lamp-making, are employed. It is hoped shortly to find regular employment for 60 or 70.

A Brazil Dock Equipment.—We learn from the *Electrical Review and Western Electrician* that the Santos Dock Co., through whose docks most of the coffee exported from Brazil passes, has recently received from the General Electric Co., of America, a complete generating station equipment—"five revolving field, 3,000-kw, 2,300-volt, three-phase, 60-cycle alternating-current generators; 350-kw. exciters; 15 1,000-kw. step-up transformers, transforming generator voltage to 44,000 volts, with complete switchboard of modern construction. Some time ago a comprehensive order including complete sub-station equipment, wiring and lighting supplies, and a large number of induction motors for operating air compressors, hoists, cranes, &c., was received from the Santos Dock Co. This apparatus is now being shipped to Brazil. The hydro-electric plant is located some 35 miles from the sub-station, and besides furnishing power for operating all the machinery at the docks, will also supply energy for light and power to various other industrial enterprises near the city."

Consular Notes.—Russia.—The German Consul at Baku reports that in the supply of explosion motors, German houses have to compete with British and American makes. The year 1907 was very favourable to Great Britain in the supply of steam engines, motors, &c., the value of the imports from that country being 500,000 roubles, as against 300,000 roubles from Germany, and 100,000 roubles from the United States.

Spain.—The British Commercial Attaché at Madrid, in a recent report, states that in spite of the large amount of electric power generated in and around Madrid for the lighting and tramways of the city, schemes are continually on foot for cheapening the cost of production, and companies with old-fashioned plant are ceasing to be producers, and are buying their power from more favoured stations. At the present time there are two schemes in process of being realised. The Hidroelectrica Espanola (authorised capital 12,000,000 pesetas, of which 10,000,000 pesetas are to be issued) is formed to establish power stations on the Rivers Jucar and Tagus, where it has acquired 42,000 h.p. from the Hidroelectrica Iberica, a prosperous electrical company of Bilbao. The construction on one of the falls of 24,000 h.p. will be proceeded with immediately. 8,000 h.p. will be conveyed to Madrid, 4,000 h.p. to Valencia, these figures to be doubled respectively in due course. The managing director of the company is Don Juan Urrutia, managing director of the Hidroelectrica Iberica. Don Estinaslao Urquijo, son of the Marquis de Urquijo, the well-known Madrid banker, has acquired a waterfall in Guadalajara, 44 miles from Madrid, yielding from 8,000 to 18,000 h.p. He has ordered twin turbines of 4,000 h.p. each from Germany. Possibly some working arrangement may be made with the unsuccessful Sociedad de Gasificacion Industrial of Madrid, which has a capacity of 12,500 h.p., generated by means of producer gas engines. One trouble is said to have been that it has not been possible to sell power sufficient to enable the engines to be run at full power, and it is probable either that the Gasificacion Industrial will buy cheap power from the new company, or that it will be brought in as an auxiliary to the new company in the summer months of drought, or the arrangement may include both these alternatives. Senor Sanchez Toca, the ex-Minister of Marine, who for a short time filled the office of Mayor of Madrid, caused the authorities of the Lozoya Canal, which furnishes an important part of the water supply of Madrid, to study a scheme for employing the fall, which is calculated to give 6,000 h.p. at 31 miles from the city. Nothing has come of this scheme up to the present. The most important lighting companies of Madrid—the Compania Madrilena, the Compania Chamberi, and the Compania del Mediodia—have formed a working agreement to last 10 years from January 1st, 1908, by which all revenue will be pooled and divided as follows:—Each company to receive a sum equal to the revenue of each company in 1906, and the excess over and above this amount to be divided in the following proportions; 50 per cent. to the Madrilena, 30 per cent. to the Chamberi, and 20 per cent. to the Mediodia. A British company, under the title of the Alliance Trust Co., is said to be contemplating the utilisation of eight waterfalls on the River Ebro, giving 42,000 h.p. The power is to be carried to Reus and other towns, and if necessary to Barcelona.

Zanzibar.—The Austrian Consul at Zanzibar reports that the Zanzibar Electric Light Co. have lighted numerous streets and private houses. The European population has generally adopted electric light, but the Indian population still retains the old petroleum system on account of the increased cost of electricity. The construction of a tramway system throughout the island was begun in 1907. The Government propose to adopt electric traction, but the execution of this plan is as yet uncertain.

Greece.—The German Consul at Athens, in a recent report, states that the imports of electrical machines into Greece come chiefly from France, the Greek industry being in French hands; however, private undertakings—*i.e.*, undertakings independent of the large electrical company—import their requirements in this branch chiefly from Germany and the United Kingdom. The horse tramway in the town of Athens is to be transformed into an electric system.

Austria.—The German Consul at Trieste reports that the Akt.-Ges. Officine Elettriche dell' Isonzo, of Trieste, which possesses electrical works in Monfalcone, near the mouth of the Isonzo River, proposes to utilise the waters of that river between Serpenizza and Karfreit for electrical and metallurgical purposes, and partly for the production of energy for lighting and power purposes in the district of Tolmein. For this purpose it is proposed to install a conducting canal 8,050 m. long to an electric station having six turbines each of 3,000 h.p., from a dam 4·40 metres high. Moreover, the Austrian Minister of Railways proposes to erect an electric station in the district of Ternovo by utilising the waters of a fall on the Isonzo River between Flitsch and Karfreit. This plant is to deliver a minimum power of 15,000 h.p. and a normal power of 23,000 h.p., and it is to be used for supplying energy for traction purposes on the railways. Also, according to the Budget proposals of the Minister of Railways, it is proposed to erect in Trieste large electrical works to supply energy for traction purposes on the Opeina-Trieste railway, in order to obviate the smoke nuisance in the tunnels on that line. The Akt. Ges. zur Nutzbarmachung der Wasserkräfte von Dalmatien, with headquarters in Trieste and works in Dalmatia, has decided to declare a dividend of 10 per cent. As regards industrial concerns in the district the following may be mentioned:—The calcium carbide works in Cernica (Sebenico) with electric works in Jaenga (on the Kerka Falls), which were finished in 1903; the hydro-electric plant of Manoj Covac finished in 1906, in which year also an extension of the calcium carbide works at Cernica was completed. The total takings of the Trieste Tramway Co. in 1906 amounted to 1,240,795 kronen, an increase of 66,660 kronen, as compared with the year 1905. The net takings were 616,666 kronen.

The shipping company, Austro-Americana, have arranged with the Marconi Co. for the installation of wireless telegraph plant on all the passenger vessels of the line. These steamers are the first of the Austrian Mercantile Marine to have wireless telegraph on board. A second telephone communication is proposed between Trieste and Vienna, and the line has been completed as far as Larbach. It is anticipated that the whole line will be at work during the course of the present year. The Minister of Commerce has authorised the installation of a telephone line, Trieste-Abbazia, connecting the Hungarian telephone system by means of the inter-urban lines, Abbazia-Fiume and Abbazia-Budapest.

Brazil.—The British Consul at Rio de Janeiro reports that in 1906 Belgium supplied Brazil with railway cars and wagons valued at £75,950. The total imports under this head amounted to £95,016. The imports from the United Kingdom amounted to only £2,342. In 1907, however, the total value in this class was £262,319, and the imports from the United Kingdom increased to £171,562, those from Belgium having declined. A glance at the table of imports shows that locomotives used in Brazil came in greatest number from the United States. They are somewhat lower in price than British engines, and are said to be more flexible, and so better adapted for the more roughly laid Brazilian railways, with their steep gradients combined with sharp curves. It is satisfactory, however, that imports from the United Kingdom under this heading increased considerably in 1907, and in a much larger proportion than those from the United States. Any further development in this class of imports from the United Kingdom would seem to depend upon the expansion of British railways in Brazil. In the importation of machinery in general in 1906 and 1907, the United Kingdom is first with an estimated value of £862,693 in 1906, and £1,261,855 in 1907. The United States runs close with an estimated value of £713,285 in 1906, and £1,189,105 in 1907. Germany comes third with £446,446 in 1906, and £669,091 in 1907.

Turin Exhibition, 1911.—The British and French Governments have announced their intention to officially participate in this Exhibition.

Book Notices.—"*American Machinists' Handbook.*" By F. H. Colvin and F. A. Stanley. New York and London: Hill Publishing Co. Price 12s. 6d. net.—To the readers of the *American Machinist* this handbook, which is the work of the associate editors, will hardly need any recommendation. Its title is sufficient. There are, however, doubtless some of our readers who are less familiar with our excellent contemporary, and for their benefit a brief review of the contents of the handbook must be given. Naturally, they consist, in the words of the authors, of "such data as will be of value to practical men in the various branches of machine work." The book is of convenient size, opening in the usual way, and is well printed, with excellent illustrations. The first subject dealt with is the fundamental necessity in modern machinery—the screw thread; gears for cutting threads, various instruments and tools, and methods of manufacture and measurement are detailed, for the different standard types of thread. Next twist drills, taps, files, &c., are dealt with, gearing and gear cutters, milling cutters, grinding wheels, bolts and nuts, &c. Calipering and fitting follow, with sections on standard tapers, and a variety of small standard parts. Ball bearings are followed by trigonometrical and other tables, wire gauges, and data of use in shop work. Natural sines, &c., are given for every minute of arc. The concluding section is an illustrated dictionary of shop terms, a novel feature in a handbook of this kind, which should prove exceedingly useful. A good index is provided. The book will form an admirable workshop companion.

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Elektrotechnische Messkunde. By Alex. Königswerther. Hanover: Dr. Max Jänecke. Price M. 4 20 pf.—This second volume of the series "Grundriss der Elektrotechnik," contains an attempt to cover the whole ground of electrical measurement (except machine testing) in a condensed manner. The first part of the book deals with the construction of galvanometers, resistances, condensers, and commercial measuring instruments. The second part is divided into eight chapters, dealing with the measurement of resistance, current, voltage, power, capacity, inductance, magnetic flux and special alternating-current measurements such as phase difference, shapes of curves, frequency, &c. In the space available, naturally only a very superficial treatment of the subject can be given, so that a great deal of important information has to be covered by means of references to other books and papers, and condensation attained in this way is of doubtful utility. The more usual methods of carrying out a particular measurement, such as that of resistance or capacity, are described in rotation without any critical comparison to enable the advantages of each to be understood. The illustrations are good, and the grouping of the information given is clear, so that, as suggested in the preface, the book may prove of use to students about to sit for an examination, or to others requiring a quick reference to the various methods available for carrying out a particular test.

Die Elektrische Kohlenglühfadenlampen, ihre Herstellung & Prüfung. By Heinrich Weber. Hanover: Dr. M. Jänecke. Price M. 9.—This book forms a useful companion volume to "Die Kohlenglühfaden," by the same author. The earlier book deals with the manufacture of carbon filaments themselves, whilst the present one deals in detail with the modern methods of manufacturing and testing the complete carbon-filament lamps. After giving a short introductory history of the development of the carbon lamp, the writer deals in successive chapters with sealing-in processes; the attachment of the filament to the leading-in wires; details of the modern American sealing-in method; exhausting the lamps; causes of and suggested curves for the blackening of lamp bulbs; repair of old lamps; photometry; attaching the lamp sockets; and the cleaning, marking, frosting, colouring and silvering of lamp bulbs. The subject of the attainment of a high vacuum is especially fully dealt with. The result is an interesting and authoritative account of one of the largest electrical industries. The fact that the metal filament is largely replacing the carbon filament leaves a great many of the manufacturing problems unchanged, and therefore does not detract as much as might be expected from the value of the book at the present time.

Fowler's Mechanical Engineer's Pocket-Book. Edited by W. H. Fowler. 1909 edition. Manchester: Scientific Publishing Co. Price 1s. 6d. net.—This is the eleventh annual edition of the Pocket-Book, which is as popular as ever. It has been revised as usual, and contains an extraordinary amount of information. Those of our readers who are not already familiar with it will find it well worth the modest price at which it is issued.

"Elementary Manual on Steam and the Steam Engine." By Prof. A. Jamieson. Twelfth edition. London: Chas. Griffin & Co., Ltd. 1908. Price 3s. 6d.

"Motor-Car Mechanism and Management: Electric and Petrol-Electric Vehicles." By W. Poynter Adams. London: Chas. Griffin & Co., Ltd. 1908. Price 5s. net.

"Les Forces Hydrauliques et les Applications Electriques au Pérou." By E. Guarini. Paris: Dunod et Pinat. Price 2 fr.

"Barrettermessungen und einige Barretterercheinungen." By Béla Gáti. Excerpt from Jahrbuch der Drahtlosen Telegraphie und Telephonie. From the Author.

Dissolutions and Liquidations. — International Telescriptor Syndicate, Ltd.—A meeting of this company is to be held at 1, Arundel Street, Strand, W.C., on January 7th, to hear an account of the winding up from the liquidator, Mr. R. H. Hoare.

D. Santoni & Co. (1906), Ltd.—A meeting is to be held at 39, Coleman Street, E.C., on December 23rd, to hear an account of the winding up from the liquidator, Mr. J. H. Duncan.

Llandudno and Colwyn Bay Electric Traction Co., Ltd.—A meeting is to be held at 21, Spring Gardens, Manchester, on December 28th, to hear an account of the winding up from the liquidator, Mr. John Morris.

Trade Announcements.—The Metallic Seamless Tube Co., Ltd., of Birmingham, announce that, owing to the enormous demand for their "Automat" lampholders since their introduction some few months ago, they have been compelled to increase their works' capacity for dealing with them. Stocks have been considerably added to to meet demands promptly.

The general offices of the Western Union Telegraph Co. in London have this week been removed to No. 33 (first floor), Broad Street House, New Broad Street, E.C. The telephone (No. 11,444 Central) remains unchanged.

Mr. Jens Orten-Boving notifies that he has ceased to act as sole agent for Messrs. Escher, Wyss & Co., of Zurich, whom he has represented since 1905. His reason for taking this step is his wish to work quite independently, and we understand that his relations with the firm are otherwise quite undisturbed.

Mr. F. H. Vitty has purchased the business of Mr. E. Southey, electrical engineer, 96, High Street, Ramsgate.

Rubber.—The Brussels correspondent of the *Daily Telegraph* states that the rubber market at Antwerp has just been the recipient of large American demands for rubber. At the monthly sale, which took place on Saturday, prices suddenly rose 40 per cent., and 300 tons of rubber were sold, at 10 fr. a kilo. Such a boom has not hitherto been recorded on the Antwerp market.

Bankruptcy Proceedings.—G. H. Smith, electrical engineer, Altrincham.—A first and final dividend of 1s. 1d. in the £ is payable November 27th at the office of the Official Receiver, Byrom Street, Manchester.

"Hello!"—The Crypto Electrical Co., of Bermondsey Street, S.E., wish the trade to know that owing to the difficulty experienced by their customers in "getting through," and to increased business, they have installed a second telephone, namely, "12831 Central."

Catalogues and Lists.—The Electric and Ordnance Accessories Co., Ltd., Birmingham.—New arc lamp catalogue (No. A 41), wherein, in the course of some 28 pages, are described, neatly illustrated and priced, the "Victor" arc lamps, of standard, miniature, enclosed, and flame types for direct-current circuits. Instructions for fixing and running, with line diagrams, also particulars of various accessories and globes are given. The general features common to all of the lamps are first stated, and the details of each different type follow. The predominating feature claimed is simplicity. We understand that all electrical and mechanical details are guaranteed for a period of 12 months. Also a card of prices of "Eclipse" electric heaters.

The "Victor" Arc Lamp.

Messrs. J. W. Brooke & Co., Ltd., Adrian Works, Lowestoft.—Catalogue illustrating and giving specification of the Brooke six-cylinder type pleasure motor-cars.

Messrs. J. B. Hamilton and Co., Ltd., 110, Cannon Street, E.C.—Two circulars giving some particulars concerning the "Unica" silent pinions and gears, which are made at the firm's modernly equipped factory at Tottenham. The pinions are made of cotton by a patented process, which is claimed to render them very strong and elastic, offering a high resistance to wear, and enabling machines to be run noiselessly at high speeds. They are made in any size up to 90 in. diameter, and are accurately cut to Brown & Sharpe's standard, with involute teeth unless otherwise specified. One of the circulars before us gives particulars of tests made on toothed gears at the Royal Testing Institution in Berlin, to determine the resistance of the teeth to breaking, and the hardness of the material.

The E.M.F. Manufacturing Co., Ltd., 10, Ironmonger Lane, London, E.C.—Advance sheet announcing reductions of prices for the E.M.F. low and high voltage metal-filament lamps.

Mr. G. Wüthrich, Oswaldestre House, Norfolk Street, W.C. (Oerlikon Co.)—Two folding lists, one giving a table of particulars of single-phase induction squirrel cage motors of from $\frac{1}{16}$ to 5 h.p. (50 cycles), built for pressures up to 250 volts; the other dealing similarly with single-phase induction slip-ring motors of from 1 to 50 h.p. for the same frequency and pressures. A three-phase d.c. motor list is to be issued shortly.

Messrs. Falk, Stadelmann & Co, Ltd., Farringdon Road, London, E.C.—New season's list (No. 289) of "Aureola" luminous electric radiators, illustrating a number of designs and stating prices. Also loose lists announcing reductions in prices of "Sirius Efesca" metal-filament lamps, and giving particulars and prices of "Efesca" auto-transformers, and of the "Lucea" and "Lucealet" enclosed arc lamps.

Messrs. Johnson & Phillips, Ltd., Charlton.—New illustrated leaflets: "J" dealing with searchlight projectors for continuous current, in which prices for standard sizes and shipping specification appear; "T" containing prices of cut-out boards, switches, wall-plugs, adaptors and connectors, ceiling-rose cut-outs, lampholders, &c.

Messrs. Adamson, Ramsbottom & Co., Ltd., Cleveland Works, Birkenhead.—48-page catalogue of the "A and R" electric cranes. Full descriptive matter is given, and there are some half-tone views of a limited number of the firm's different types, including those of two-motor electric crabs, and 3, 5, 10 and 20-ton three-motor electric travelling cranes; also some hand travelling cranes, electric gantry wharf cranes, electric warehouse and derrick cranes and electric capstans. Reference is also made to some 16-ton "A and R" electric traversers supplied for the Cambridge Street coal depôt (London) of the Midland Railway Co.

Messrs. J. H. Holmes & Co., Newcastle-on-Tyne.—List No. 106, consisting of 44 pages, in which there are given some notes of the firm's progress in the application of their electric motors to printing machines since the last list appeared in 1906. They have, during the last few years, equipped altogether 350 newspaper offices and printing works with plant, involving 3,100 dynamos and motors, aggregating 25,500 h.p. A number of interesting photographic

reproductions appear, showing some of their motor-driven printing applications, these including some of the leading newspaper and other publishers in London and in important provincial centres. Appropriate views of the firm's enclosed switchgear, and so on, are followed by a tabular list of works with their Holmes and "Holmes-Clatworthy" motor-driven equipments.

The British Westinghouse Electric and Manufacturing Co., Ltd., Publishing Department, Norfolk Street, W.C.—This is a bulky collection of lists which defy detailed reference, but which, brought together in a stout, expansible binding-case, form a very full and useful Supply Catalogue—that is, a catalogue of a very great variety of electrical manufactures generally described as "supplies," to distinguish them from the various other and heavier lines of manufactures of the company. We do not know where to begin, unless it be at the beginning. There we have a convenient index to catalogue and style numbers, pages, &c. Enclosed arc lamps then lead the way, followed by Westinghouse-Bremer flame arcs, Cooper-Hewitt mercury vapour lamps, watt-hour meters, small motors and dynamos, incandescent lamps, electrical accessories (including lampholders, switches and many other small things). We then arrive at starting rheostats and control panels for D.C. motors, knife switches, oil-insulated transformers, controllers and resistances for use with slip-ring induction motors. Our zeal in "getting through" the catalogue is then tempered by the "Ariel" electric fans, after which we go on rejoicing again with enclosed switch type auto-starters, Westinghouse tungsten lamps, direct-current switchboard panels, direct-current shunt-wound motors for small powers, liquid starters and controllers, until we come to the section on lightning arresters, whereat we pause again, for we are a little more than halfway through. Impressed now with the wideness of the field covered, and with an appetite whetted for more, we proceed—we are now at section 25, and there are 42 altogether, many of them consisting of quite a number of pages, fully and well illustrated, and containing numerous useful diagrams—and find ourselves among reversing controllers and unit-type resistances. "Trafford" electric induced-draught stoves, stove-radiators and glow lamp radiators, is an interesting section; then come starting rheostats for S.P. slip-ring induction motors; various choice electric light fittings, of which we had the pleasure of seeing some excellent examples at Manchester Exhibition; auto-transformers and balancer transformers; electric pocket lamps; "Premier" accumulators; wires and cables; electric bells and everything required in connection with them; electric cooking and heating apparatus; brake magnets or solenoids; flame-tight and explosion-proof switch and fuse boxes; watt-hour meters again; telephones and telephone requisites (a full section), and lastly a modest little leaflet on glassware. We have devoted so much space to merely indicating broadly the nature of the contents that we have none left to enter into matters in detail, but we have no doubt that there will be a clamouring among our readers for a book describing so complete a collection of Westinghouse electric supplies. The sections that are most in demand at the present time are naturally those dealing with enclosed and flame lamps, Cooper-Hewitt lamps, also tungsten lamps and small transformers for same.

British Insulated and Helsby Cables, Ltd., Prescot.—Two new pamphlets. No. L 30 describes the Phantophone, which has already been referred to in the Electrical Review in our descriptions of the firm's exhibits at the Manchester Exhibition, and gives diagrams showing the methods of using same; No. H 34 describes self-sealing condensers (Mansbridge's patent) for telegraph and telephone circuits, motor-car ignition, &c. Prices are given in both lists.

Messrs. Ed. Bennis & Co., Ltd., Little Hulton and London.—8-page illustrated pamphlet (copies of which our readers can have by applying to the firm) on "Boiler House Economies in Drapery and Furnishing Stores." The half-tone views show the Bennis stokers in service in the power-houses of Messrs. Jones & Higgins, of Peckham, and Messrs. D. H. Evans & Co., Ltd., of Oxford Street, W.

Messrs. J. & H. Grevener, Eldon Street House, E.C.—New price list (B 2) of various metal and carbon dynamo and motor brushes, also giving prices of cylindrical bellows for cleaning dynamos.

Messrs. D. H. Bonnella & Son, Ltd., 58 and 60, Mortimer Street, W.—Advance leaflet showing and stating prices of their new "Crystalite" lineal reflectors (Brown's patent) for shop window, gallery, library, and other such lighting. The lamps and holders are supported on hinged boxes, which allow them to be turned out of the reflector, so that the latter can easily be cleaned from end to end.

Messrs. Morris-Hawkins, Ltd., 75b, Queen Victoria Street, E.C.—New catalogue of direct and alternating-current motors and dynamos. General descriptive matter, and a specification accompanied by small half-tone illustrations of parts, are followed by tabulated voltages, powers, speeds, catalogue numbers, prices, weights and shipping dimensions, of protected and enclosed-ventilated type motors, variable-speed motors, also similar particulars regarding single and double automatic starters, shunt regulators, shunt and compound-wound dynamos, open-type balancers, two and three-phase induction motors and motor-starters. We are asked to state that the firm's works are now under entirely new management, and prompt delivery can be given of all machines up to 30 H.P., which are supplied under full guarantee for 12 months. The Morris-Hawkins manufactures range from 1 to 250 H.P.

Messrs. F. Darton & Co., 42, St. John Street, London, E.C.—An interesting illustrated price list (48 pages) of various electrical novelties suitable for Christmas presents and other purposes.

LIGHTING and POWER NOTES.

Acton.—At a recent meeting of the Electricity Committee, Councillor Eydmann brought forward the following motion which the Council had referred back to the Committee:—"That, in the future, work of electric light wiring be carried out by the electricity department, where the cost is estimated not to exceed £30; and that for work estimated to exceed that figure the electrical engineer be instructed to obtain tenders, and submit the same to the Committee." In the course of his remarks, the speaker made serious allegations against the efficiency of the staff of the undertaking, and asserted that in some instances meters were not put into houses for three days, a week, a month and even three months after the supply was connected up. He said that the engineer had not got the control over the men under him that he should have. Mr. J. M. Blair, the electrical engineer, in reply to a question, said that he had from time to time complained to the Committee of the inefficiency of certain employés of his department, but he had not been upheld. After a prolonged sitting, the meeting was adjourned.

Barnstaple.—The T.C. has decided to grant a 10 per cent. discount off the cost of lighting the town by electricity, and has also agreed to consult with Mr. Trentham, of London, as to still further improvements in the administration of the undertaking. The total cost of public lighting for the past half-year has been £1,430.

Belfast.—An electrical stamping machine was recently put up in the General Post Office, Belfast, which can stamp letters at the rate of 800 per minute. The representative of a local paper wrote for permission to photograph the machine, but although the machine can stamp letters with such celerity, it took the department 22 days to reply, and it then refused permission.

Braunton (Devon).—Steps are being taken by Mr. S. I. Knill, of Barnstaple, on behalf of Messrs. Crompton & Co. to ascertain the probable number of electric light consumers and the probable cost of establishing an undertaking with overhead distribution.

Blackpool.—As a result of experiments, Mr. C. Furness, borough electrical engineer, has advised the Electricity Committee to invest £300 from the reserve in electrical cookers, which could be let out at about 3s. per quarter. Electricity at 1d. per unit would work out at approximately the same cost as gas for cooking purposes. The principle of cooking by electricity is to be demonstrated at a forthcoming Trades Exhibition in the new year.

Bridgend.—A L.G.B. inquiry has been held into the application of the U.D.C. for sanction to borrow £8,250, for the purchase of the Bridgend power station and plant of the South Wales Electrical Power Co. The Bridgend station was erected at a cost of £38,000; recently in consequence of its unsatisfactory position, the company offered to sell the station and mains to the Council for £14,000, and ultimately agreed to take £5,000. Before deciding on the purchase, the Council concluded agreements with the Angelton and Parcywyllt asylums for the supply of both light and power. Last year the asylums consumed, roughly, 130,000 units and the town 120,000 units. The balance over the purchase price is for improvements.

Canada.—The works of the Canada Tin Plate and Sheet Steel Co., at Morrisburg, Ont., the first of the kind in Canada, have been electrically equipped by the Allis-Chalmers-Bullock Co., of Montreal. A 350-H.P. three-phase motor operates the cold roll equipment, and two 650-H.P. motors similarly drive the hot mills—rope drives being provided.

The first sod in connection with the Ontario transmission from Niagara, was cut on the 18th inst.; the work is expected to occupy two years.

Continental Notes.—Italy.—Application has been made to the authorities of the Province of Novara for a concession to utilise the water-power of the River Sessia at Roggia dei Molini in the generation of electrical energy for power purposes.

Spain.—The society formed at Bilbao for the purpose of constructing a station on the River Tor, served by an artificially created fall of 165 m., has placed the order for the works and equipment with the firm of Grasset & Co. for 9,000,000 pesetas. The Swiss firm of Brown, Boveri & Co. will furnish the electrical material and that of Bell & Co. the turbines. The power generated, totalling 16,000 H.P., will be transmitted to Barcelona, a distance of 90 km., at a pressure of 54,000 volts.—*La Energia Electrica.*

Sr. Don Juan Manuel Arios, of the Electra Industrie Vianese, has obtained the concession for the electric lighting of the town of Viana de Bolte.

Dublin.—The Lighting Committee of the Dublin Corporation held a special meeting on Thursday afternoon to consider the recent outbreak of fire at the City Hall. After considerable discussion, the following resolution was unanimously adopted:—"That the Lighting Committee, having investigated all the circumstances connected with the recent fire at the City Hall, and having received the reports of its chief engineer and a statement from Captain Purcell (Fire Brigade), is quite satisfied that the electrical supply was in no way connected with the origin of the fire."

Felixstowe.—At a meeting of the U.D.C. on November 18th, it was stated that the Suffolk Electricity Supply Co. had accepted the Council's offer of £3,500 for its interest in the

undertaking, machinery, mains and plant. It was decided to apply for a loan of £13,000 for the purchase money, and for the purchase of additional plant.

Hanley.—A new 500-KW. Howden-Westinghouse generating set was started on Friday, last week. The engine is arranged to run condensing, with a Körting ejector condenser, and its official start was the occasion of a gathering of the Council and officials.

Haslingden.—At the meeting of the B. of G. on November 19th, a copy of an agreement was read between the Ashton-under-Lyne Union and the Corporation, whereby the latter agreed to supply the union with electricity for lighting purposes at the rate of 2d. per unit; the Rawtenstall Corporation wanted 3d.

Hastings.—At a recent meeting of the T.C., on the the recommendation of the Electricity Committee, it was resolved to make application to the L.G.B. for sanction to the borrowing of £5,000 for prospective capital expenditure of the following sums: New mains and house services, £4,000; meters, £500; and transformers and instruments, £500. It was explained that no new mains would be laid without the consent of the Council.

Hounslow.—A L.G.B. inquiry was recently held into the Council's application to borrow some £7,000, largely for work already carried out. Ultimately the amount was reduced to £6,364, of which £3,000 had already been expended.

Ilford.—At a recent meeting of the U.D.C. a letter was read from the secretary of the Ilford Gas Co., calling attention to the Council's electric lighting advertisement displayed on a board upon the Council's land at Balfour Road, which, it was stated, was misleading and untrue. The company asked the Council to withdraw the advertisement, or to permit the company to have an advertisement stand adjoining, in order that it might be able to set forth the advantages of using gas. The company's secretary pointed out that it had been established for 70 years, and was authorised by law to supply gas to the ratepayers. On a proposal to refer the letter to the General Purposes Committee there was an animated discussion. Councillor Church deprecated anything being done to raise the ire of the gas company, who had been of good service to the town. He did not think that they gained much by advertising the electric light, and it would be better to recognise that the gas people were there to stay. Councillor Philpot suggested to the previous speaker that he should read some of the gas company's advertisements. The Council, he pointed out, had got electricity to sell, it had £150,000 of capital invested in it, and had the interests of the ratepayers to safeguard. It was competing with the gas company, and this fact should be recognised. If Councillor Church could induce the gas company not to advertise, there might be some reason in his argument that the Council should refrain from advertising. The objection of the gas company was not to the board, but to the successful form of advertising adopted—setting forth in pictorial form the advantages to be derived from using electricity rather than gas. Councillor Broad said the letter from the gas company proved, to his mind, that the advertisement was a good one, and was having effect upon the people of Ilford. In the result, the matter was left in the hands of the committee concerned to deal with as it thought proper.

London.—HAMPSTEAD.—The agreement come to in 1896 between the then Hampstead Vestry and the Hendon U.D.C., whereby the former was empowered to lay mains and supply electricity in Hendon until the latter Council was itself in a position to supply, has been brought to an end. The Hendon Council obtained a prov. order, and afterwards transferred its rights, powers, &c., to Messrs. Crompton & Co., who in turn disposed of them to the Hendon Electric Supply Co., who in March last gave the Hampstead Council six months' notice to terminate the agreement. The total cost of mains and services laid by the latter in Hendon was £903, and, as the result of negotiations, the Hendon Co. has agreed to take over for £200 certain mains which cost the Council £399. The B.C. is to remove its mains in Cricklewood, and it has been agreed that the cost of opening the ground and making it good, where the trench so opened can be utilised for laying the company's new mains, shall be halved.

HACKNEY.—The Electricity Committee has had under consideration the question whether the laying of cables in future should be carried out by contract, as in the past, or by the works staff under the electrical engineer; but as some time will necessarily be occupied in coming to a decision in the matter, the Council has extended the contract with the B.I. & H. Cables, Ltd., to March 31st, 1909.

Neath.—A L.G.B. inquiry was held on Friday last into the application from the R.D.C. for a loan of £18,000 for E.L. at Blaenhonddau, Coldfranc, Dyffryn Clydach, Dowlais Lower, and Llantwit Lower. The application was by the Blaenhonddau parish on the ground that a lot of money had been overspent. The amount applied for includes £8,000 for the generating station and certain mains of the South Wales Electrical Power Co., which company had originally supplied the Council in 1905.

Preston.—The T.C. has appointed a committee to consider the question of acquiring the undertaking of the National Electrical Supply Co. in the borough.

Radcliffe.—An inquiry on behalf of the L.G.B. was held on Wednesday last week, relative to the U.D.C.'s application for sanction to borrow £14,350 for extensions of the electricity undertaking. Chief opposition to the scheme came from the Lancashire Electric Power Co., whose works are in the district. Witnesses for the local authority were called to show that the concern had been conducted in a businesslike manner, and that it would be cheaper to carry out the extension scheme than to take a supply of energy in bulk from the Power Co. on the terms submitted. On the other hand, Mr. Pickstone, for the opposition, conducted his examination with the idea of showing that the Council had imposed such regulations that firms which might otherwise have come into the locality and been supplied by the Power Co. had been prevented from doing so. The solicitor for the U.D.C. replied that his clients had only sought legitimately to protect their powers, and had never received a guarantee that the Power Co. would fulfil obligations which might be entered into. The inspector adjourned the inquiry until December 10th.

South Africa.—JOHANNESBURG.—It was reported to the T.C. on October 27th that summonses had been served at the instance of the Council in the Scottish Courts against Messrs. D. Stewart & Co., Ltd., and Mr. William Beardmore and Mrs. Joseph Beardmore, the widow and executrix of the estate of the late Mr. Joseph Beardmore. The case is in connection with the gas engines at the electric power station.

PORT ELIZABETH.—At a recent ratepayers' meeting, authority was given the T.C. to raise a loan of £25,000 for the purpose of extending the electric light system. There was practically no opposition.

BLOEMFONTEIN.—The fire at the Government Building, in which damage was caused to the extent of about £100,000 is (as usual) credited to a defect in the electric light wiring. Two electricians were at work at the time of the outbreak and gave the alarm. Strangely enough, there is another version, that the fire had been smouldering for some days, and that the outbreak was due to the electricians raising the felting under the roof, and thus allowing an ingress of air.

Stourbridge.—The Council has resolved to seal the agreement regarding the promotion of a prov. order by the Council on behalf of the Midland Electric Corporation. The latter concern is paying the cost of promoting the order.

Walton-on-the-Naze.—A prov. order for E.L. is being applied for by the Coast Development Corporation, Ltd.

Wrexham.—A L.G.B. inquiry was held recently with reference to the borrowing of £6,850; the application was eventually amended for a sum of £4,165.

York Town.—The York Town and Blackwater Gas Co. is applying for Parliamentary powers to supply electricity in the parishes of Frimley (Surrey), Hawley, Minley and Yateley (Hants.), and Sandhurst, Finchampstead, and Wokingham Without (Berks.).

TRAMWAY and RAILWAY NOTES.

Black Country.—The B.E.T. Co. has announced to the various authorities concerned, its intention of again granting the concession of halfpenny fares for children, which was withdrawn some time ago. The Quarry Bank, Brierley Hill, and Rowley Regis Light Railways Joint Committee is to make application to the B. of T. for an extension of the time for completion of the proposed line from Cradley Heath to Brierley Hill until December 23rd, 1909. The various local authorities concerned are to hold a meeting to consider the question.

Canada.—The formal inauguration of the electric service through the St. Clair tunnel, which couples Sarnia, Ont., and Port Huron, Mich., took place on November 12th. The electrical zone includes the tunnel, 6,025 ft. long, and a similar length of approaches, and is operated on the single-phase system from a power house on the Port Huron bank of the St. Clair River. Three new electric locomotives, each consisting of two 750-H.P. half-units, have been provided, and electrical pumping plants are installed at each end of the tunnel. The Westinghouse Co. has carried out the work at a cost of $500,000, and to the plans of the Arnold Co., of Chicago.

London.—The Central London Railway is to seek Parliamentary powers next session to extend its line to Liverpool Street Terminus, from the Bank. The estimated cost of the scheme is about £250,000.

HAMMERSMITH.—The B. of T. has written on the subject of the application made by the London United Tramways Ltd., for the appointment of a referee under Sec. 33 of the Tramways Act, 1870, to settle a difference between that company and the Hammersmith Borough Council, that it has informed the company that, in the circumstances, it is unable to proceed with the application until the legal question referred to has been determined by the Court. Delegates are to be appointed to a conference convened by Ealing B.C. on the subject of the noisy cars and defective condition of the tracks of the London United Tramways, Ltd.

Portsmouth.—The T.C. has decided to apply for a prov. order to construct new tramways in the borough.

Preston.—Application is being made by the Preston, Chorley, and Horwich Tramway Co. for an extension of time for completing the works authorised by the Acts of 1903-4-6.

Continental Notes.—HOLLAND.—According to a Press announcement, the Dutch Government has granted to the Flushing-Middelburg Tramway Co. a concession for the conversion from steam to electric traction of its light railway between these two places.

West Prussia.—The town of Bishofs Werder has decided to erect a generating station at a cost of £10,000, and another £24,000 is to be expended to connect the town and railway station by an electric narrow-gauge line; the distance is about 4 kilometres.

Spain.—The French Société Anonyme de Tramway de Madrid et d'Espaque, of Madrid and Paris, has obtained the concession for the construction and working of an electric tramway from the Glorieta Alsono Martinez to Chamartin de la Rosa.

Turkey.—Only a portion of the new shares of the Constantinople tramways will pass into French hands, and with regard to the electrification of the system, only a portion of the contract for the work will be entrusted to French firms. The greater part of the share capital is being held, and much remains in the hands of the syndicate headed by the Continental Co., of Nuremburg.

Croydon.—At the Council meeting on Monday a report by the manager (Mr. T. B. Goodyer) was presented regarding the L.C.C. extension from Streatham to Norbury, where the Croydon system begins. In view of the additional amount of traffic which the through service to London would bring to Norbury, and in order to be able to deal expeditiously with the same, the Committee recommended that a "scissors" cross-over be placed there, which would enable three or four cars to be loaded up simultaneously. The work was estimated to cost £800, which will be charged to capital account, and it was agreed to without discussion.

Leeds.—The T.C. has received sanction to a loan of £21,000 for the extension of the tramways.

Llandudno.—At the monthly meeting of the U.D.C. on Wednesday last week, Mr. W. O. Williams called attention to the recent surveying of streets and of the Marine Drive. The electrical engineer (Mr. Harold Morton) explained that this was in connection with a suggested electric line round the Orme's Head, and that he had had assistance in making the preliminary survey. All the figures and a report were to be handed over to him (Mr. Morton), and in due course would be brought before the Electricity Committee.

New Zealand.—The Dunedin City Council has decided to carry out the extension of the present generating system, so as to provide for the generation of an additional 2,000 kw., which will bring the total available power up to 4,000 kw. A tunnel is to be constructed at Waipori to take the place of the existing fluming. The city electrical engineer estimates the cost of the scheme at £20,900.—*Board of Trade Journal.*

Perth.—A controversy has arisen over the tramway finances, and various schemes are suggested to increase the revenue. It is believed that, with a freer hand, Mr. Lambert, who is electrical engineer and manager of the Corporation tramways, could put a better face on things. A proposal that meets with some favour is that the system should be extended so that circular tours would be possible. Workmen's cars and cheaper fares are also asked for.

Pontypridd.—At a recent meeting of the Electricity Committee the tramways engineer reported that during a recent storm a considerable length of feeder cable and troughing had been washed into the river and a section box buried. This interfered with traffic and affected receipts to the extent of £35 or £40 for the week.

United States.—In an address delivered before the Electrical Club of Chicago on the subject of the electrification of steam railroads, Mr. F. A. Sager stated that the railroads will have to spend approximately $5,000,000,000 within a few years to keep up with the increase of traffic. By electrifying their lines at a cost of $4,000,000,000, they would increase their capacity to such an extent that no new trackage would be needed.

According to the *Financial News*, the statements regarding the New York-Philadelphia Railway electrification are not to be credited. Contracts have been let, however, in connection with the opening of the Hudson and East River tunnels, the new New York terminal and various local electrical lines.

According to an American correspondent, Mr. T. Johnson, Mayor of Cleveland, announces that as a result of a seven years' fight for 3-cent fares on the street railways of the city, he is now practically a poor man; the cost of the fight is given as £1,000,000.

Yardley.—On Sunday evening last a Yardley-Birmingham car caught fire while proceeding to the city, this being due to the fusing of a controller; some slight injury resulted to four of the passengers.

TELEGRAPH and TELEPHONE NOTES.

India.—The Government contemplates the raising of the inland rates for telegrams by 50 per cent., the present rate (for so-called "deferred" messages) of 4d. for 10 words, including address, having been found to involve a heavy loss. In future "ordinary" messages will be charged 6d. for 12 words, and "express" messages one rupee (1s. 4d.) for 12 words.

Japan.—The *Telegraph Age* states that the China-Japan Convention regarding the Port Arthur-Chifu cable was signed at Tokio on October 12th last.

Spain.—The Compania Peninsular de Telefonos, which is already working the Bilbao-Santander network and those serving various districts of Cataluna, as well as the Noroeste interurban line, has obtained a concession for an international telephone line from Zaragoza to Irun, the construction of the line in the south and for the enlargement of 16 stations in the north-west of the peninsula. For the new works in hand it proposes to increase its capital from three to thirteen millions of pesetas by the issue of shares bearing 5 per cent. interest.

Time Signals.—A reduction has been made in the charge for the transmission to private premises of a signal from Greenwich Observatory indicating 10 a.m. by British standard time.

Telegraphic Interruptions:—

Port Arthur-Chifu	March 9, 1904
Cotonou-Grand Bassam	October 29, 1908

Wireless Telegraphy.—According to the *Matin*, two engineer officers of the Italian Navy, Messrs. Bellini and Tosi, who have been carrying on experiments in France for the past 18 months, and whose work has already been described before the London Physical Society, have succeeded in controlling the direction of the electric waves in wireless telegraphy. A message was sent from Pourville to Havre without affecting the station at Barfleur, which is quite near the latter place.

The Liverpool Chamber of Commerce is approaching the Colonial Office with the view of having wireless stations erected at Farcados and Lagos, owing to the constant breakdown of the existing telegraph line.

CONTRACTS OPEN and CLOSED.

OPEN.

Algeria.—January 15th. Tenders are invited by the Bône municipal authorities for—(1) the construction and working of a central electric power station, and (2) the construction and working of an electric tramway. Copies of the projects, specifications, &c. (in French), may be seen at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

Australia.—Victoria.—Submarine cable-repairing plant for the P.M.G. See "Official Notices" November 6th.

Queensland.—January 4th and 11th, 1909. Tenders are required by the Postmaster-General for:—No. 1, telegraph instruments, accessories and spare parts; No. 2, telephone instruments, accessories and spare parts; No. 3, switchboards, accessories and spare parts; No. 4, measuring instruments, protectors, accumulators and parts. Tenders for the foregoing by January 11th, 1909; and for cables, copper wire, iron wire and insulators, by January 4th, 1909.

Melbourne.—December 15th. 33,200 incandescent lamps for the Council. See "Official Notices" to-day.

Austrian Silesia.—The Volunteer Life-Saving Brigade of Troppan require tenders for an electrical motor ambulance. Particulars may be obtained from the Secretair der Freiwilligen, Rettungsabtheilung.

Baku.—January 24th. The T.C. is inviting tenders for its electric tramway concession (42 years). Full particulars at the Russian Consulate in London.

Belgium.—December 23rd. La Société Nationale des Chemin de Fer Vicinaux, 14, Rue de la Science, Brussels, is inviting tenders for the contract for the supply and erection of the overhead equipment, and the electric connections for the rails, of the light electric railway between La Louvière and Binche. Plans and specification can be obtained from the address given above after December 8th, at a cost of 1 fr.

Birmingham.—The Corporation Electricity Department will be glad to hear from firms capable of building large gas engines and producer gas plants. See "Official Notices" November 20th.

Canada.—Winnipeg.—December 28th. A *Financial Times* dispatch from Winnipeg says that the municipality on 24th inst. resolved to invite tenders, to be delivered by December 28th, for extensive power plant, the cost of which is stated at more than £1,000,000.

Colchester.—November 30th. Electric lighting plant, motors, wiring, telephones, &c., for the Essex County Lunatic Asylum. See "Official Notices" October 30th.

Constantinople.—The Conseil Administratif de la Direction Générale des Postes et Telegraphes requires tenders for 17,000 kilos 4-mm. iron wire; 3,300 kilos 2·5-mm. copper wire; 4,000 insulators, medium size; 225 25-mm. tubes for copper wire; one wheel for spooling the wire. A deposit of 10 per cent. is required, or a guarantee signed by the Notariat of the Chamber of Commerce, Constantinople.

Dover.—December 9th. Electrical sundries and electric cables for the Dover Harbour Board (2s. 6d. for schedule). Martyn Mowll, Register, Castle Street, Dover.

Dublin.—November 30th. Stores for the Dublin United Tramways Co. (1896), Ltd. See "Official Notices" October 30th.

Felixstowe and Walton.—December 12th. Diesel oil engine and dynamo for the U.D.C. See "Official Notices" to day.

Germany.—The municipal authorities of Neuss are about to invite tenders for the construction and working of an electric tramway between that town and Grimlinghausen.

Hackney.—December 17th. D.C. electricity meters, of the ampere-hour motor type, for the electricity department. See "Official Notices" November 13th.

Italy.—The Mid-Italy Railway Company in Naples is inviting tenders for the conversion of the Naples-Piedmont-Alife line to electric traction.

London.—December 1st. Electric lighting, bells and fans for Clapham Secondary School for the L.C.C. See "Official Notices" November 20th.

Manchester.—December 1st. The Tramways Committee invites tenders for tramcar trucks and tramcar resistances (grid type). J. M. McElroy, General Manager,

December 9th.—Exhaust steam and other pipes for the Electricity Committee. See "Official Notices" to-day.

North-Eastern Railway.—December 3rd. Electrical and telegraph stores. E. H. Clark, Gateshead (for electrical stores); C. H. Ellison, Telegraph Superintendent, York (for telegraph stores).

Trimdon Grange (Co. Durham).—December 12th. Electric fittings for a year for Walter Scott, Ltd., Trimdon Grange Colliery. Storekeeper, Trimdon Grange Colliery.

Tyrol.—HOFGARTEN COMMUNALITY.—January 1st, 1909. Electric generating station; utilisation of local water-power. Apply by January 1st, 1909, to Gemeinde Vorstand.

CLOSED.

Aldershot.—The U.D.C. has accepted the tender of Messrs. Heenan & Froude for a refuse destructor, at £753.

Bury.—Messrs. J. R. Norris & Co., of Oldham, have secured the contract for the electric lighting of the East Ward Council Schools, Bury.

Cape Town.—In our last issue we stated that the tender of Messrs. Geo. Findlay & Co. for motor-starter panels had been accepted, and that the manufacturers were *Electrical* Instruments, Ltd. We are informed that the panels in question will be manufactured by *Engineering* Instruments, Ltd., of Islington.

Caversham.—The engineer of the Thames Conservancy reported to the Upper River Committee that, in carrying out work at Caversham Yard, an economy of about £60 per annum would be effected if the sawmill and other machinery in the new buildings were driven by electricity instead of by steam, and that as the portable steam-engine which now supplies the power is old, the present time was opportune for making the change. The Committee agreed to the engineer's report, and on Monday the Board accepted the tender of Messrs. Harland Bowden & Co., Manchester, to carry out the work within six weeks, at £220.

Dover.—The T.C. on Tuesday accepted the tender of the British Westinghouse Co. for an alternator, at £533. A L.G.B. loan for £600 is to be applied for.

Glasgow.—The T.C.'s Sub-Committee on Tramway Works and Stores has accepted the following offers:—

Lead-covered cables.—British Insulated and Helsby Cables, Ltd.
Single-core cable.—British Insulated and Helsby Cables, Ltd.
Trolley poles.—Mountain & Gibson, Ltd.
Car brake chains.—Weldless Chains, Ltd.
Mica.—Micanite and Insulators Co.
Electrical instruments.—Weston Electrical Instrument Co.
Aluminium ribbon leaf.—Coe Ribbon Gold Leaf Manufacturing Co.

Leith.—The Tramways Committee has accepted the following offers in connection with the supply of materials for the extension of the local tramway system:—

Points and crossings.—Hadfield's Steel Foundry Co., £1,772.
Overhead equipment.—Tramways Supply Co., Leeds, £1,251.
Portland cement.—Johnstons, Ltd., £2,040.

London.—HOLBORN.—The tender of Messrs. Foote and Milne, Ltd., has been accepted for the electric lighting of High Holborn Library, at £101 10s. Messrs. John Bolding & Sons, Ltd., who previously received the contract to carry out the work, at £78 4s. 8d., have withdrawn on account of having made an error in their tender.

L.C.C.—The Highways Committee of the L.C.C. has considered the following tenders for the roadwork and platelaying in connection with the reconstruction, on the conduit system, of the tramways from King's Cross to Malden Road, and the construction of authorised lines in Crowndale Road:—

J. Mowlem & Co. .. .. (recommended)	£47,584
W. Manders	47,642
Dick, Kerr & Co.	47,782
A. M. Cole	53,528
Estimate of Council's engineer	49,059

The under-mentioned tenders have been received for the supply of two 5,000-KW. steam turbo-generators for the second portion of the Greenwich station:—

Belliss & Morcom, Ltd. (Westinghouse generator)	£37,850
" " (Electric Construction Co.'s generator) (Alternative tender)	37,644
Electric Construction Co., Ltd. (Belliss turbine)	37,858
British Westinghouse Co. (Rateau turbine)	40,800
Belliss & Morcom, Ltd. (General Electric Co.'s generator) (Second alternative tender)	41,821
General Electric Co., Ltd. (Belliss turbine)	42,249
Willans & Robinson (Dick-Kerr generator)	43,174
Electric Construction Co. (Parsons turbine) (Alternative tender) ..	43,736
C. A. Parsons & Co. (Parsons generator)	44,055
British Thomson-Houston Co., Ltd. (British Thomson-Houston generator)	44,620
C. A. Parsons & Co. (Westinghouse generator) (Alternative tender)	44,688
James Howden & Co. (Westinghouse generator)	48,495
General Electric Co., Ltd. (Parsons turbine) (Alternative tender)..	49,137
Electric Construction Co., Ltd. (Musgrave turbine) (Second alternative tender)	50,328
John Musgrave & Sons, Ltd. (Westinghouse generator)	50,890
" " (Electric Construction Co.'s generator) (Alternative tender)	51,237
Electrical Co., Ltd. (A.E.G. generator)	57,700

The Highways Committee, in reporting on the tenders, draws attention to the two lowest, by Belliss & Morcom, and states that the turbo-generators made by this firm and in operation are not of a size commensurate with those required. Although the Committee recognises that the firm has a high reputation for reciprocating engines, it felt it essential that the contractors for the work should have had experience in the manufacture of turbines comparable with those to be installed at the generating station. The first three tenders include Belliss & Morcom turbines, whilst the fourth, which was submitted by the British Westinghouse Co., includes turbines of the Rateau type. As there are no examples of a large type of the latter class of machine in operation in this country, it was arranged that the chief officer of tramways and the tramways electrical engineer should visit works in Milan where Rateau turbines are in use. Having considered a report by the chief officer of tramways, the Highways Committee recommends the acceptance of the offer of the British Westinghouse Co. for the sum of £40,800, the turbines to be on the Rateau principle and containing the main features of those inspected at Paris and Zurich by the Council's officers.

The firms mentioned below have tendered for the delivery of (A) 344 pony-wheel axle bearings, (B) 200 driving-wheel axle bearings, (C) 100 armature bearings of 3 A type, and (D) 100 armature bearings of 25 A type:—

	Price per lb.				Allowance on old bearings per lb.
	A	B	C	D	
Anti-Attrition Metal Co. (accepted)	1/1½	1/1½	1/4	1/5	9½d.
Mountain & Gibson	1/0½	1/0½	1/3½	1/3½	8½d.
Bowen & Co.	1/0½	1/0½	1/1½	1/1½	6d.
Willans & Robinson	1/7½	1/8	2/5	2/4	2d.

Lowestoft.—The T.C. has accepted tenders for the supply of materials for the electricity undertaking as follows:—

White waste.—Jones, Manchester, 26s. per cwt.
Coloured waste.—Jones, Manchester, 20s. per cwt.
Odd stores.—R. Leach, Lowestoft.
Brass and iron screws.—T. E. Thirtle, Lowestoft.
Wood bushes.—Rudd Bros., Lowestoft.
Oil (crank and chamber).—Vacuum Oil Co., London, 1s. 5d. and 1s. 4d. per gallon.
Oil (dynamo).—Wakefields, 1s. 3½d. per gallon.

West Ham.—An order has been placed with Messrs. Cory & Son for 14,000 tons of washed pea-nut coal at 8s. 10d. per ton, delivered alongside the wharf at the electricity undertaking, for 12 months from May next.

CONTRACTORS' COLUMN.

[The following information is published in the interests of electrical contractors and others who are seeking for openings for new business. Considerable expense is incurred in the production of this column, and every care is taken to ensure that the information is new and accurate, but it will be understood that in a matter where so many correspondents are engaged, and where the amount of information to be handled is very large, this cannot always be guaranteed. If alleged inaccuracies are reported to the Editors, they will be fully investigated.]

ABERAVON.—Parsonage for Vicar of Aberavon. J. A. James, architect, Port Talbot.

ABERCARN.—Proposed accident hospital (£5,200). Abercarn Urban Council.

ABERDEEN.—Conversion of church in Crimon Place into Boys' Brigade headquarters; G. B. Mitchell, architect, 142, Union Street, Aberdeen. New music hall for the Robert Arthur Theatre Co.

ABOYNE (Aberdeenshire).—New motor garage. Geo. Bennet Mitchell, architect, 148, Union Street, Aberdeen.

ALDERSHOT.—Extension of the refuse destructor building for the U.D.C. Crosby & Co., builders, Aldershot.

ALLOA.—New boiler house at the Grange, for Bass Crest Brewery Co.

ALTCAR (near Liverpool).—New bungalow for the officers of the 7th Battalion The King's (Liverpool Regiment). Capt. F. Campbell, architect.

AMERSHAM (Bucks.)—Houses at Chalfont St. Peter. H. A. Harben, Newland Park, near Amersham.

ARMAGH.—Extension of the Court-house (£750). Surveyor to the County Council.

ASCOT (Sunningdale).—Additions to Oakley and to the Schools. Mr. Love, builder, Sunningdale.

ASHTON-IN-MAKERFIELD. — Houses, Bolton Road, Thomas Williams; Ashton Heath, Mrs. Kearsley; Princess Road, Arthur Watson; Downall Green Road, Thos. Haselden; Bolton Road, Brynn Co-operative Society.

AYLESBURY.—Houses, Walton Road, for Mr. Holland; Chiltern Street, for P. J. Scott.

BAILDON (Yorks.).—New Wesleyan Sunday Schools; T. C. Hope & Son, architects, 23, Bank Street, Bradford. Two houses, Moorland Avenue, for Taylor & Ellis; detached villa residence, for H. Constantine.

BANGOR (Co. Down).—Proposed hot Sea Baths; Urban Council.

BARNSLEY.—Proposed new School at Silkstone, for the Penistone District Education Committee. Institute in connection with St. John's Church; W. H. Dixon, hon. sec., 5, Eastgate, Barnsley.

BARROW-IN-FURNESS.—House at Risedales, for Z. Bennett; E. M. Young, architect, 70, Duke Street, Barrow-in-Furness.

BATH.—Rebuilding several blocks of shops in Avon Street, for City of Bath Charity Commissioners (£50,000). Mr. Rolfe, architect, Belmont, Bath.

BECKENHAM.—House, Shortlands Road, Beckenham; Crossly & Sons. Shop and stables, corner of Avenue and Birkbeck Road; S. H. Manktelow, Birkbeck Road, Beckenham.

BELFAST.—Proposed extension of the Corporation gas works.

BELPER.—Proposed recreation institute. C. M. Hiskinson, secretary.

BEXHILL.—Detached houses, Sutherland Avenue; C. W. Spencer, architect. Additions to the Beehive, Dorset Road, for Miss Browning; G. H. Gray, architect, 21, Sea Road.

BILLERICAY (Essex).—Additions to workhouse laundry. R. J. W. Layland, architect, Billericay.

BIRKENHEAD.—Gas works extension (£110,000); Borough Engineer. Installation of electric light in West Kirby Parish Church.

BISHOP AUCKLAND.—New music hall for Rino Pepi, managing director of the Darlington Hippodrome.

BISPHAM (Lancs.).—Pair of semi-detached houses, Messrs. S. Midgley and E. Reynolds; pair of semi-detached houses, Arundel Road, G. Fletcher; three houses, L. Cohen; extensions for the Gynn Estate Co.; houses for Mrs. E. Bikker, and motor-car shed, Knowles Avenue.

BLACKPOOL.—Projected new Wesleyan Church, Highfield Avenue. Trustees, Blackpool Wesleyan Circuit.

BLACKROD (Lancs.).—Restarting and development of weaving shed. H. S. Paterson & Co.

BLACKWOOD (Mon.).—Twelve houses, for the Rhos Newydd Building Club. D. J. Thomas, architect, 99, High Street, Blackwood (Mon.).

BLAENAVON.—Twenty houses and eight shops; John Morgan, builder, Forge Side, Blaenavon. Extensions to County Schools (£1,450); clerk to Mon. C.C., Newport.

BOLTON.—Workshops, &c., in Manchester Road, Rosehill, for J. E. Johnson, builder and joiner; developments at Breightmet for S. Scowcroft & Sons, colliery owners.

BREDBURY (near Stockport).—Proposed Church Institute. Vicar, St. Mark's Church, Bredbury.

BRIDLINGTON.—New pumping station at the Higher Waterworks. E. R. Matthews, borough surveyor, Town Hall, Bridlington.

BRIGHOUSE.—Proposed new secondary school on the Manor House Estate (£10,000); Sutcliffe & Sutcliffe, architects, New Road Offices, Hebden Bridge. Restarting and probable alteration of Britannia Mill; Mr. Farrar, Holywell Green, Stainland.

BRISTOL.—Bank for Metropolitan Bank of England and Wales. Catley and Lawrence, architects, 26, Orchard Street, Bristol.

BRYNMAWR.—Rebuilding Castle Hotel (£8,000). T. Roderick, architect, Clifton Street, Aberdare.

BUCKHAVEN (Fife).—New premises for Methil Co-operative Society. Haxton and Walker, architects, Leven.

BUCKINGHAM.—Mansion at Poundon for Heywood Lonsdale. Benfield and Loxley, builders.

BURNLEY.—Extensions to the Victoria Hospital, to be electrically lighted (£20,000).

(Hapton).—Proposed new County Council school (300 children). Councillor Mason, chairman of the Hapton Parish Council.

BURNOPFIELD (Co. Durham).—Ten houses for the Co-operative Society.

BURTON-ON-TRENT.—Laboratory in connection with new rubber industry, for Dr. Docherty and Mr. Allsebrooke; proposed new premises corner of Ferry Street and Main Street, for the Co-operative Society; proposed additions to the Infirmary (£1,300), H. Beck, architect, 10, High Street, Burton-on-Trent.

BUXTON.—Additions to works, Hogshaw, for Richard Ash.

CANTERBURY.—Extension of the City School of Art; A. C. Turley, City Surveyor, Guildhall Street, Canterbury. Extensions to Chartham Lunatic Asylum, including remodelling of laundry and renewal of machinery (£4,500).

(Elham).—Receiving wards (£367). Eeles Bros., builders, Elham.

CARDIFF.—Warehouses in Bridge Street; Bruton & Foster, architects, 119, Queen Street, Cardiff. Converting three houses in Tresillian Terrace into ice warehouses, for Neale & West; E. W. M. Corbett, architect, Bute Estate Office, Castle Street, Cardiff. Four houses in Pencisely Road, for Blacker Bros.; J. W. Rodger, architect, 14, High Street, Cardiff.

CASTLE EDEN (Co. Durham).—Two new colliery shafts to be sunk on the Hardwick Estate, for the Horden Collieries, Ltd., Castle Eden.

CHALFONT (near Gerrard's Cross, Bucks.).—Houses, North Park Road, Chalfont St. Peter, for H. Brown; Orche Hill Avenue, for W. T. Walker; Bull Lane, for Walker & Hopkins.

CHESHAM BOIS (Bucks.).—Houses, Parkfield Avenue, for B. Stone & Son; Parkfield Avenue, for H. Belch.

CHESTER.—Proposed central Masonic Hall in Hunter Street.

CHESTERFIELD.—Proposed Council school at Palterton. G. H. Widdows, architect, Council Education Offices, St. Mary's Gate, Derby.

CHISWICK.—New Wesleyan Methodist Church at Sutton Court (£5,765). New theatre at Young's Corner.

CHORLEY.—Proposed new Roman Catholic Church and Schools in Railway Road.

CHRISTCHURCH (Hants.).—Extensions to Knapp Mill, for Barnes and Maidment; houses, Manor Road, for Cox Bros.; Grove Road East, for Mrs. E. Butler; Manor Road, for R. Wicks.

CLYDEBANK.—Dwelling houses in Albert Road, Radnor Park. R. M'Alpine and Sons, builders.

COGGESHALL (Essex).—Clothing factory for Hollington Bros., 8-14, Middlesex Street, Aldgate, London, E.

COLWYN BAY.—New Y.M.C.A. premises and hostel (£9,000).

CONGLETON.—Proposed new school at Wheelock. County architect, Chester.

COVENTRY.—Two houses, Sandy Lane, for E. C. & F. C. Robinson; house, Rochester Road, for W. E. Haywood; house and shop, Wright Street, for C. Chamberlain.

CRESWELL (near Bolsover).—Probable re-erection, after fire, of Co-operative stores (lit by electricity), for Bolsover Co-operative Society.

CROWBOROUGH (Sussex).—Police station and police residences, Station and North Roads. F. J. Wood, county surveyor of East Sussex, County Hall, Lewes.

CROWTHORNE (Berks).—Residence for Miss P. Audry; additions to residence at Holly Cross, for A. J. Balkeby; residences for Mr. Drewatt and Mr. Fullbrook.

CROYDON.—Thirty-two houses and shops, London Road; W. T. Wheeler, 46, Chancery Lane, W.C. Ninety-six houses in four streets; A. Gosheron, Holmesdale Road, South Norwood. Six houses, Lower Addiscombe Road; Hine & Blythin, Morland Road, Croydon. Six houses, Elmgrove Road; H. E. Roper, 116, Lebanon Road. School and house, Melville Avenue; G. Atkinson, The Limes, Croydon. Eight houses, Semley Road; L. Whitebread & Co. Forty-eight houses, Sherwood Road; G. B. Bates, Malvern Road, Croydon. Eleven houses and shops, Lower Addiscombe Road; G. B. Bates. Ten houses, Lower Addiscombe Road; H. R. Hunter, Lower Addiscombe Road. Ten houses, Melfort Road; F. Brown. Nine houses, Nutfield Road; W. M. Lucas, 91, Brigstock Road. Four houses, Lakehill Road; D. Weightman. Conversion of three houses into public offices for the R.D.C. Six houses, Totton Road; W. C. Moseley, Sutton. Dyeing and cleaning works, Waddon Marsh Lane; G. R. Ellis, 71, Clarendon Road, Croydon. Two shops, 250-252, London Road; W. B. Coomber, 65, Pemdevon Road, Croydon.

CULTER (Aberdeenshire).—Renovation of Culter House, for T. Crombie, 18, Albyn Place, Aberdeen. Walker & Duncan, civil engineers, Aberdeen.

DARTFORD.—Church (£10,000). W. D. Caroe, architect, 3, Great College Street, S.W.

DENBEATH (Fife).—School house and janitor's house at Denbeath. G. C. Campbell, architect, Methil.

DENNY.—Alterations to property, for Wm. Wright, Gogarfield; alterations to property, for A. Fraser, Dunipace.

DERBY.—Elementary school at Parkfields Cedars, Kedleston Road (£13,800); Derby Education Committee. Proposed car-sheds, alterations to Corporation slaughter-houses, and new cooling chambers; Borough Engineer, Derby. New Institute at Borrowash; Chairman of the Parish Council, Borrowash.

(New Mills).—New Secondary School. New Mills and District Higher Education Committee.

DISLEY.—New School. Butterworth & Duncan, architects, Rochdale.

DONCASTER.—Important colliery undertakings at Thrybergh, Dalton Main Collieries, Ltd.; Labour-in-Vain Inn to be rebuilt, for Hewitt Bros., Ltd., brewers, St. Sepulchre Gate, Doncaster; thirty cottages, Don Street, for C. Sprakes & Son, 37, East Laith Gate, Doncaster.

DOVER.—Alterations to premises of Turnpenny Bros., house furnishers, London Road and Bridge Street, Dover. Two dwelling houses, Old Park Avenue, Crabble Hill; W. J. Bromley, builder, Dover.

DUMFRIES (N.B.).—Prospective rebuilding, after fire, of the Town Hall.

DUNDEE.—Mechanical engineering laboratory at University College, to cost £13,000; Sir R. Rowand Anderson, architect, Edinburgh. Proposed new church in West End; the Rev. Geo. Smart, School Wynd Church.

DUNFERMLINE.—Dwelling house, Cameron Street; Messrs. H. and J. Philip, Campbell Street Works, Dunfermline. Extension to motor works, Castleblair; J. G. Thomson, engineer, Castleblair, Dunfermline. Additions to premises for G. Butchart, aerated water manufacturer, St. Margarets Street; Alex. Anderson, Headwell Road, Dunfermline. Houses, coach-sheds, and stables, for J. Wilson, Cameron Street.

DUNSTABLE.—Houses, Union Street, for J. Swain; West Parade, for F. W. White; Park Street, for Mr. Knight.

EARBY (near Colne, Lancs.).—Proposed new Anglican Church (£4,000).

ECCLES.—Important additions for Nasmyth, Wilson & Co., Ltd., engineers, Patricroft; alterations to Council School, Half Edge Lane.

EDINBURGH.—Ten villas at Craiglea Place, for James Scott.

ELSECAR (near Barnsley).—Council School for the West Riding of Yorks C.C. J. Vickers-Edwards, County Architect, Wakefield.

ERDINGTON (near Birmingham).—Extension of schools for from 300 to 350 children, for Warwickshire C.C.

FAILSWORTH (Manchester).—New Holy Trinity Church. F. Freeman, architect, Smalley's Chambers, Bolton.

FALKIRK.—Additions to property in Mungalhead Road, for J. Jarvie; additions to property for J. Strang, Fisher Street, Camelon.

FARNWORTH (Bolton).—Projected alterations at Market Street Congregational Schools; Trustees. Proposed central school; H. Rostrom, secretary, Local Education Committee.

FELLING (Co. Durham).—Ten houses at High Heworth, for the Heworth Coal Co., Ltd. John Simpson, Heworth Colliery Office, Felling.

FLEETWOOD.—Seven houses, Oak Street; T. W. Graham. Ten houses, Oak Street and Willow Street; J. England. Houses, Dronsfield Road, for E. Greaves; Dronsfield Road, for W. Miller; Oak Street, for T. W. Graham; Oak Street and Willow Street, for J. England.

FORFAR.—New public baths (£5,770). H. J. Blanc, architect, 25, Rutland Square, Edinburgh.

GALASHIELS (N.B.)—New academy. Galashiels School Board.

GARFORTH (near Leeds).—New Parochial Hall (£350). Rev. R. C. Wilford, Rector.

GERRARDS CROSS.—Houses, Bulstrode Way, for the London and County Investment and Property Co.; Packhorse Road, for Aubrey Wright; Bulstrode Way, for A. C. Cook; The Woodlands, for A. C. Meyjes; Marsham Lane, for C. P. Lovell.

GORSE HILL (near Manchester).—Proposed new church (£5,000). E. Woodhouse, architect, Mosley Street, Manchester.

GRANTHAM.—Houses, South Parade, for J. Christian and Mr. Barker.

GREENOCK.—Building at Smithston, for the Parish Council. Stewart, Tough and Alexander, architects, 2, Hamilton Street, Greenock.

GUILDFORD.—Extensive alterations to premises, for Joseph Clarke & Sons, stationers and booksellers, 159, High Street.

GUISBOROUGH.—Sixteen houses, Hedley Street, for the Co-operative Society.

HAMPSHIRE.—New schools for the County Education Committee at Broughton (£3,008) and Lymington (£2,783).

HASLINGTON (near Crewe).—New Wesleyan Church and schools (£1,020). Jas. Martin, architect, Parr's Bank, Chambers, Nantwich Road; Proctor, Major & Mason, builders.

HAYDOCK (near St. Helens).—New church (£4,500). E. H. Lingen Barker, architect, Manchester; Geo. Litherland, builder, St. Helens.

HARROGATE.—Houses, Norfolk Road, for Raworth Bros.; Langcliffe Avenue, for J. Hamilton Brown; Torre Road, for S. Broadbank; Stonefall Avenue, for F. Tong; Cavendish Avenue, for G. Readman; rear of Eastville Terrace, New Park, for J. L. Hampton-Matthews; Willow Grove, Bilton, for Carrick & Cundall; Church Avenue and Skipton Road, for H. Dawson; Bilton Grove Avenue, for C. A. Nettleton, builder, Balmoral House, Bilton; alterations to business premises, Crescent Road, for Farratis, Ltd., grocers, &c.; additions to Britannia Lodge, Swan Road, for W. Stancliffe; mission room, Grove Park Terrace, for the Vicar of Christ Church; alterations and additions to 14 and 16, James Street, for E. J. Clarke, milliner, &c.; additions to premises, Parliament Street, for Phillipson and Co.; alterations to business premises, Station Square, for Foster & Foster.

HENLEY-ON-THAMES.—Mortuary, receiving wards, and other additions to workhouse. C. Smith & Sons, architects, 164, Friar Street, Reading.

HESSLE (near Hull).—Church and schools. T. Atkinson, architect, Trinity House Lane, Hull.

HIGH WYCOMBE.—Extensive alterations and improvements to premises, for Hull, Loosley & Pearce, Ltd., 19, Oxford Street.

HUDDERSFIELD (Honley).—New Congregational Church. Rev. G. W. Gervis, pastor, Honley.

HULL.—Extensive petroleum storage sheds at Saltend, near Hull, for the North-Eastern Railway Co.

HUNGERFORD (Berks.).—New elementary school (600 children) for the C.C.

HUNSLET.—New paint shops, new offices, and extensions to mechanics' shops, at works. W. T. Turner, architect, Market Hill, Barnsley.

HYDE (Cheshire).—Two houses, Church Avenue, Gee Cross, for A. B Wilkinson. Extensions at Godley Green Margarine Works, for the Maypole Dairy Co., London.

INVERURIE.—New Post Office in West High Street. The Postmaster, Inverurie.

ISLE OF SHEPPY.—Large pottery works at Queenborough, for Alfred Johnson.

KEIGHLEY.—Sunday school in St. Peter's parish (£1,000). Rev. R. Stansfield, vicar of St. Peter's.

KIDSGROVE.—New Church of England Schools. A. B. Wood & Sons, architects, Market Place, Burslem.

KIRKBY-CUM-OSGODBY (Lincolnshire).—Alteration to school. Scorer and Gamble, architects, Bank Street Chambers, Lincoln.

KIRKCALDY.—New premises for salt works, for Mr. Gibb, Tolbooth Street; house and dancing hall in St. Brycedale Road, for Mr. Currie; double villa at Loughborough Road, for A. Carmichael. Alterations to public house in High Street, for A. Lawrence; Mr. Wallace, agent.

KNUTSFORD (Cheshire).—Extensive renovation of parish church, Over Tatley. Rev. A. Symonds, vicar.

LAURIESTON (Stirlingshire).—New factory for W. Young, boot manufacturer, The Square.

LEEDS.—Central roller skating rink. Apply to S 79, *Yorkshire Post*, Leeds.

LEPTON (Yorks.).—House and shop, Junction of Cowms Chapel Lane and Wakefield Road, for Mrs. S. E. Webster.

LERWICK.—Harbour extension works. J. Barron, 216, Union Street, Aberdeen.

LINTHWAITE.—House at Roydhouse; A. Shaw, architect, Knowle Road, Golcar. Houses, Casson Street, Milnsbridge, for E. Pearson; Causeway Side, for J. W. Thorpe; dye house, Burdett Mills, Milnsbridge, for Armitage Bros.

LISCARD (Cheshire).—Four houses, Parkside. Hughes Bros., Allington Road, Aigburth, Liverpool.

LITTLEBOROUGH.—Improved sewage works; surveyor, Council Offices, Littleborough. Extensions for Brookfield Manufacturing Co.

LLANDRINDOD WELLS.—Rebuilding Bridge Hotel (£9,000). A. L. Thomas, architect, Church Street, Pontypridd.

LOFTUS (Yorks.).—Warehouse for A. Robinson.

LONDON (Bermondsey, S.E.).—Iron additions at E. Ellis & Sons' tannery, Horney Lane; Croggon & Co., Ltd., 16, Upper Thames Street, E.C.

(Peckham, S.E.).—Building on site of 188, Rye Lane, for the Magnet Printing Press, Peckham, S.E.

(Hammersmith, W.).—Enlargement of Godolphin and Latymer School (£8,700). The School Governors.

(E.C.).—Adaptation of premises in Ray Street, Farringdon Road, as L.C.C. General Stores; W. E. Riley, Superintendent Architect, L.C.C., Spring Gardens, S.W. Block of shops and offices, City Road, for Trustees of Sutton Estate; E. C. P. Monson, architect, Grosvenor House, Acton Vale, W. Additions, Royal London House, Finsbury Square; J. Belcher, architect, Hanover Square, W. Alterations to convenience at the Royal Exchange, and new underground convenience in Eastcheap; Town Clerk, Public Health Department, Guildhall, E.C.

(Kensington, W.).—House in Logan Place. E. W. Marshall, architect, 139, Oxford Street, W.

(Marylebone, W.).—Rebuilding No. 29, James Street. Hudson and Hunt, architects, 24, York Place, Portman Square, W.

(Holborn, W.C.).—Buildings at 8-14, Wild Court. Brown & Barrow, architects, 12, Norfolk Street, Strand, W.C.

(Stratford, E.).—Memorial Hall. G. Baines & Son, architect, 5 and 6, Clement's Inn, W.C.

(West Ham, E.).—Rebuilding Adam and Eve public house, Abbey Road. R. Wittock.

(Camberwell, S.E.).—Enlargement of Oliver Goldsmith School (£6,000). Two storey cottages, Atwell Street. A. E. Mullins, architect, 48, Peckham Road.

(Greenwich, S.E.)—Extension to sack building, Morden Wharf. A. Edmunds.

(Silvertown, E.).—Additions to store, for Tate & Son. Extension of copper stores; G. Munday & Sons, builders, Islay Wharf, Poplar, E.

(Custom House, E.).—Six double tenement houses. W. Harris, builder, Elizabeth Street, North Woolwich.

(Barking, E.) —Buildings in course of erection at Creek's mouth, for the British Coalite Co.

(Kensington).—Caretaker's quarters at Central Library (£440). Borough Surveyor, Town Hall, High Street, Kensington.

(Battersea, S.W.).—Booking office, &c., for the London and South-Western Railway Co.; Perry & Co., builders, Tredegar Works, Bow, E. Mission Hall, New Road; Lathey Bros., builders, New Road, Battersea.

(Highgate, N.).—Additions to Northern Hospital, Winchmore Hill (£500). W. T. Hatch, engineer, Asylums Board, Thames Embankment.

(St. Pancras, N.W.).—Buildings, Gordon House Road. A. W. Armstrong, Grove Farm, Highgate Road, N.

(Notting Hill, W.).—Erection of billiard room at Conservative Club, 168, Ladbroke Grove. H. Corry & Son, builders, 48, Pembridge Road, W.

LONDON (Hendon, N.W.).—Four houses, Sunningfields Road, and eight houses, Audley Road and Park Road; E. Evans, surveyor, 253, Lavender Hill, S.W. Phthisis Ward, for Hendon Board of Guardians; The Clerk. Fourteen stables, Golder's Green; J. Gibb, junr., builder, 191, West End Lane, West Hampstead, N.W. Car repair shop, Edgware Road, for Metropolitan Electric Tramway Co., Ltd.

(Hammersmith, W.).—Six houses in Aycliffe Road. Barnett and Brotchie, builders, 68, Salisbury Road, Kilburn, N.W.

(Chelsea, S.W.).—Additions to South-Western Polytechnic. F. G. Knight, architect, 13, Victoria Street, S.W.

(Wandsworth, S.W.).—Manual training centre, Fountain Road (£567). E. Trigge, builder, The Chase, Clapham.

(Bethnal Green, N.E.).—Blocks of houses, Minerva Street. W. E. Wallis, architect, 12, Buckingham Street, Strand, W.C.

(Hampstead N.W.).—Three cottages, Temple Fortune Hill, for Tenants, Ltd.

(E.).—New Jewish Hospital in Stepney Green.

(Finchley, N.).—Church. P. Lamb, architect, 1, Clifford's Inn, W.C.

(Chelsea, S.W.).—Block of flats, Manor Court. Bochmer & Gibbs, architects, 11, Spring Gardens, S.W.

(Whitechapel, E.).—Extensive alterations to business premises for T. Venables & Son, Ltd., High Street and Commercial Street.

(Wimbledon, S.W.).—Refuse destructor and sludge conveyor (£9,760), for the T.C.

LOWESTOFT.—Additions to hospital (£3,026). G. H. Hamby, surveyor, Borough Council. Six houses, Worthing Road; J. and B. Swatman, builders, Milton Road, Lowestoft.

MACHEN (near Newport, Mon.).—Two houses, for Mark Shepherd, Tredegar Arms, Machen.

MAIDSTONE.—Extensions to Barming Heath County Lunatic Asylum, for Kent C.C. (£9,500). Stables, John Streets, for Thornton Bros.; business premises, Gabriel's Hill, for Geo. Foster; new bank for London and County Banking Co., 21, Lombard Street, E.C.

MANCHESTER.—Extensive new premises, Market Street and Mosley Street; Wood & Co., builders, Salford Iron Works. New block of buildings to Manchester University; The Governors. New works in Ashburton Road, Trafford Park, for the British Steel and Wire Co.

MANSFIELD.—Church Hall for St. Mark's Parish (£1,500); Rev. H. L. Day, Vicar. Houses, Victoria Street, for Mr. Brailsford; Thoresby Street, for W. Read; Stella Street, for G. W. Butler, jun.; houses and shop, Goldsmith Street, for A. J. Copestake; rebuilding Bull's Head Inn, Portland Street and High Street, for the Nottingham Brewery Co., Ltd., Mansfield Road, Nottingham.

MARGATE.—New General Post Office, Cecil Square; H. A. Collins, architect, care of H.M. Office of Works, Storey's Gate, London, S.W. Two houses, Victoria Avenue, for A. E. Wiles; two houses and shops, Northdown Road, for Moodey & Chisfield; proposed lavatories, Cliftonville, for the T.C. (£2,582).

MIDDLESBROUGH.—Test labour sheds; Middlesbrough Board of Guardians.

NATLAND (near Oxenholme).—Rebuilding church. Austin & Paley, architect, Lancaster.

NEWBURY.—Proposed new municipal offices, Mansion House Street. S. J. L. Vincent, surveyor to the Town Council.

NEWPORT (Mon.).—Alterations at the Westgate Hotel for Mr. Watts, Coburg Hotel, London.

(Isle of Wight).—Proposed joint hospital at Staplers for Newport T.C., St. Helens U.D.C. and the Isle of Wight R.D.C. (£8,000).

NOTTINGHAM.—New school at Trent Bridge. F. B. Lewis, city architect, Guildhall, Nottingham.

OLDHAM.—Tramway depôt at Hollinwood for the T.C. Borough Surveyor.

PADIHAM (near Burnley).—New school for 620 children, for Lancs. C.C. H. Littler, architect, 16, Ribblesdale Place, Preston.

PLYMOUTH.—Anglican Church, Peverel Park. W. D. Caroe, architect, 3, Great College Street, S.W.

PORT GLASGOW.—Eight houses in Shankland Road and Birkmyre Avenue. J. Forsyth, Ivybank, Port Glasgow.

PORTSMOUTH.—Shop, F. W. Pounds, 2, Common Street; two shops, Milton Road, G. Lusby; painting and drying store, Marmion Road, Mr. Mott; two houses, Bosham Road, C. W. Sugant, 157, Queen's Road.

PONTARDAWE.—Proposed new offices for the B.G. (£1,500).

PONTEFRACT.—Villa residence, Red Hill, Glass Houghton, for F. S. Gregory.

PRESTON.—Suggested new grammar school. Governors, Preston Grammar School, or Director of Education, Preston.

QUEENSBURY (Yorks.).—Extensive alterations to the Hall of Freedom, for the Queensbury Rechabite Tent.

RADCLIFFE (Lancs.).—School in Black Moss under consideration, Radcliffe Education Authority; new fire station for the U.D.C. (£5,500).

RAMSGATE.—Extensive alterations to business premises, for J. E. Couchman, jeweller, &c., 29, High Street. Houses, Ellington; John Newby, builder, Grange Road, Ramsgate.

READING.—Conversion of houses into shops, in Oxford Road; Frank Cooksey and Walker, agents, 17, Market Place, Reading. Houses in Northumberland Avenue; H. Trinder, builder, Star Lane, Lower Caversham, Reading. Proposed alterations and improvements to Reading School; H. T. Pugh, clerk to the Education Committee, Blagrave Street, Reading.

RHYL.—Eleven houses in Belmoral Grove, for R. Jones; additions to the Royal Alexandria Hospital; shop, warehouse and store room, for R. K. Hughes.

ROCHESTER.—New offices for the Medway Conservancy Board. G. E. Bond, architect, 384, High Street, Rochester.

ROMFORD (Hornchurch).—New Congregational Church and schools; Rev. B Nicholls, Pastor. Babies' Hall; Wm. Smith, clerk to Board of Guardians.

RUGBY—Additions to shop, Regent Street, for F. Thompson; house, Elsee Road, for Mrs. Allen; five lock-up shops, Henry Street, for A. F. Whittaker; stables and coachhouse, Great Central Railway Station, for F. Garner.

ST. ANNES-ON-THE-SEA.—New Baptist Church (£3,000 or £4,000). Trustees.

ST. AUSTELL.—Four houses at Slades, for J. Mellow.

ST. HELEN'S JUNCTION (Lancs.).—Monastery. Robert Curran & Son, architects, Warrington.

ST. JUST (Cornwall).—Council school at Pendeen. S. Hill, architect, Green Lane, Redruth.

SCILLY (near Penzance).—Residence for Mr. Hopkins (about £1,000).

SHEERNESS.—Higher elementary school for Kent C.C. (£6,418). Proposed school at Half-way Houses, Minster-in-Sheppey; W. P. Prosser, clerk to the County Council, Maidstone. Six houses, Alexandra Road, for Mr. Moxon.

(Continued on page 987.)

W. M. MORDEY.

President Institution of Electrical Engineers.

William Morris Mordey was born on March 28th, 1856. He is a good example of a man who is the sole architect of his own fortunes; for, though he comes of good old Durham stock, his grandfather being Dr. William Mordey, F.R.C.S., several times Mayor of Sunderland, he started life and worked his way up without an expensive education, without any help of any kind from outside, and without capital.

He entered the Postal Telegraph Service at the early age of 14, and has, with quiet but dogged determination, climbed from that position to the chair of the Institution. Shortly after beginning as a telegraph operator, he was sent to Bradford, and there he devoted, what would have been another boy's leisure, to teaching classes made up of his fellows, and others. He taught telegraphy, magnetism, and electricity, in connection with the Science and Art Department and the City and Guilds Institute. He thus realised early in life, that the best way to learn a subject, and to make sure you understand it, is either to write a book or to lecture on it. He then went in for the examination of the City Guilds as a student with his own class, and gained the prize and medal in 1881.

Photo by] [O. & K. Edis, Sheringham.

W. M. Mordey.

In the same year he left the Telegraph Service, and secured an opening in the Brush Electrical Engineering Co., at the works in Lambeth Road. He was at once made superintendent of the testing department. He remained with the Brush Co., in various positions, from 1881 to 1897, a period of 16 years of extraordinary activity. After a very few years Mr. Mordey began to be heard of. The science of dynamo design was in a chaotic condition in those days. Mr. Mordey tackled all such questions experimentally, and he first became known in connection with the design of modified Schuckert ring machines, and questions of commutation connected with them. He then developed a whole series of direct-current machines of his own design, mostly four-pole ring armature dynamos.

Maxwell once said that the greatest discovery of modern times was the reversibility of the dynamo. In spite of that, in the early eighties it was generally supposed that a good dynamo must be a bad motor, and a good motor a bad dynamo. Mordey exposed this fallacy in an article in the *Philosophical Magazine* about 1885.

For about five years from 1887 there was immense activity in the development of alternate-current engineering. Mr. Mordey was in the forefront of this movement, and designed a form of transformer that was made in enormous numbers, and several ingenious forms of alternator, one of which has gained a world-wide reputation as the Mordey alternator. He did some very important experimental work also on the parallel running of alternators, and the running of synchronous single-phase motors.

He brought out, at the beginning of 1893, a system of testing alternators under full load conditions with a small driving power. He has also done excellent work in connection with the ageing of iron in transformers—which he experimentally examined and first explained in a Royal Society paper in 1894. And through his specifications for iron for the Brush Co., and his consulting connection with makers since, he has done much to secure the production of iron in this country of high magnetic qualities.

Mr. Mordey's work has lain much more in the direction of designing and making than in talking; but he has also added a great deal to the stock of electrical knowledge by his papers and by joining in the numerous discussions at scientific and technical societies' meetings. Perhaps one of his most interesting papers was one which nearly seven years ago he wrote — with Mr. Bernard M. Jenkin as his co-author—on "Electric Traction on Railways." This had the honour of occupying the Institution of Civil Engineers for five nights, and was awarded two gold medals—the Telford and Stephenson medals.

He has been an active member of the Institution for many years; and has served on the Council almost continuously since 1883. A glance at the *Proceedings*, especially between 1885 and 1900, when the design of electrical machinery was developing, will show how much work he has done for the Institution.

One of his doctrines is that a man who makes no mistakes makes nothing else, and the efficiency of an engineer can be estimated by the cubic contents of the scrap heap he has piled. This method of measurement does not bring Mr. Mordey out well, as his scrap heap is very small compared with his output. It does exist though, and there are some odd objects on it. There is, for example, a dynamo that cannot give any output at all. Two dynamos of this type coupled together, would give a good alternating output, but as only one was made, this is cold comfort. But most of us prefer a veil drawn over our scrap heaps. In this connection, however, Mr. Mordey introduced "dynamoes" as a plural, and "periodicity" for frequency. The first is the logical plural, like potatoes or tomatoes, and being logical, it never became popular. The term "periodicity" is, unfortunately, still to be found in odd places.

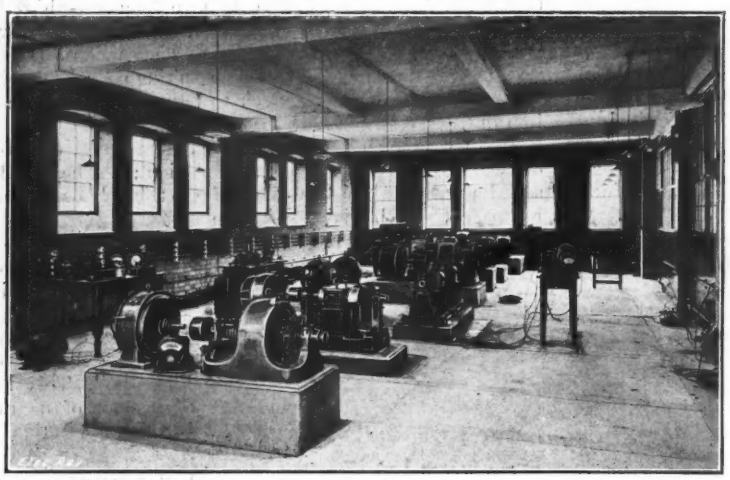
Since leaving the Brush Co., Mr. Mordey has developed a large practice as consulting engineer, and in 1900 Mr. R. A. Dawbarn joined him. Our President's technical work is best known to the older men in the profession. The younger generation have little idea of the pioneer development between 1880 and 1895, or the difficulty of studying with no good electrical engineering text-books.

In spite of the early age at which he left school, Mr. Mordey is a man of wide knowledge and wide interests. He

has never had much leisure, but what he has had he has used very efficiently. He has a great love of children, and is in perfect sympathy with them and complete understanding of them; amongst the distinctions he prizes most is that of being a grandfather. He is fond of music, and when he can get a chance, he will join the basses in a choir or choral society. He never had time to play an instrument himself, but his daughter is an accomplished pianist.

He is a member of the Alpine Club and has been for many years a keen Alpine climber, and he spends any time he can get among the mountains, either in summer or winter. He knows his Switzerland very well. He lives in Victoria Street, alone, and spends his week-ends in long cross-country walks alone. He is on the London University Board of Studies in Electrical Engineering, is a Member of the Institution of Civil Engineers, and of various engineering and scientific societies.

J. S.



University of Leeds: Dynamo Room.

NEW LABORATORIES, LEEDS UNIVERSITY.

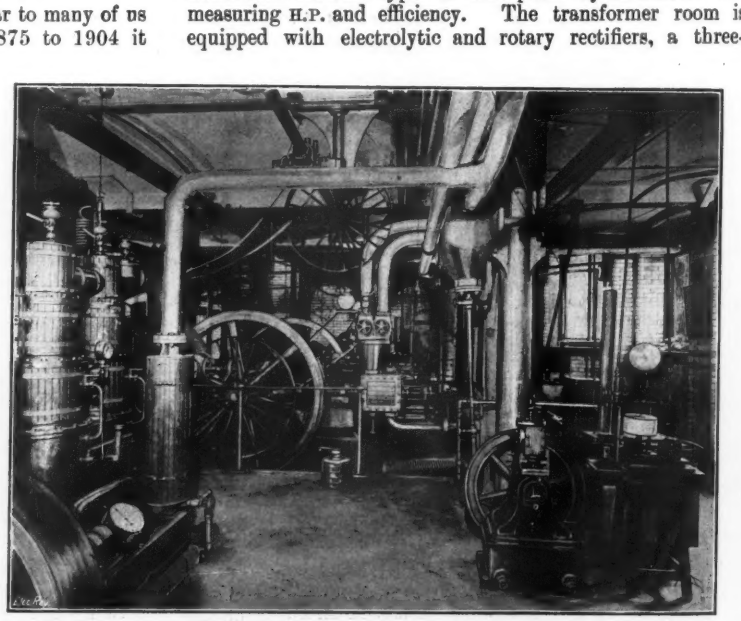
The "Yorkshire College" is more familiar to many of us than the "University of Leeds"; from 1875 to 1904 it was one of the most important centres of science teaching in the North of England, and from 1887 to 1903, as one of the constituents of the Victoria University, it enjoyed University rank. Growing by frequent additions, and continually enlarging its scope, the College was well worthy of the charter which was granted in 1904; its only rival in the county of Yorkshire was the Firth College, Sheffield, now also a University; but the Leeds institution is the county University, all parts of Yorkshire, except Sheffield, bearing a share in its control.

The Privy Council when recommending the grant of a University charter to the College stipulated that its funds should be increased. In any other country, a liberal endowment would have been provided by the State, but our enlightened Government refuses to recognise a University as comparable in importance with a battleship (to paraphrase Dr. Stratton); hence the Council of the College was called upon to raise the necessary capital. As the result of four years' efforts, the sum of £100,000 was secured, more than half of which was expended on extensions of buildings and new apparatus. The Electrical Engineering department acquired in this way a new detached block, in addition to the buildings existing, and the Mechanical and Civil Engineering department was also extended, while several other equally important extensions were carried out in other departments.

In July last the new buildings were declared open by His Majesty the King, accompanied by the Queen and Princess Victoria.

The new building for Electrical Engineering comprises a Lecture Theatre, supplied with a variety of electrical pressures, phases and frequencies; a drawing office, photometer room, private research laboratory, transformer room, instrument room, elementary laboratory, electro-motor room and dynamo room. The last-named is illustrated herewith, but since the view was taken the equipment has been greatly extended, and 18 switch panels have been erected.

The plant installed includes some twenty-six different types of direct and alternating-current generators, motors, double-commutator converters, rotaries and rectifiers by the best makers, of which there are eight large direct-coupled motor-generator sets, ranging from 4 to 30 H.P., in the dynamo room. The motors of these sets are of the most modern types, with multipolar fields and commutating poles in the larger sizes, for giving wide variable-speed ranges. The generators of direct current are respectively series, shunt and compound-wound machines, including a 500-volt compound-wound dynamo. The alternators are respectively single, two and three-phase machines. Two of the dynamos are fitted with arrangements for delivering three-phase, and one for delivering two-phase, alternating currents, and hence can be used as rotary converters for converting continuous to single, two and three-phase alternating currents or *vice versa*. In addition there is a 10-KW. Westinghouse rotary converter and an Electric Construction Co.'s motor-generator of 2½ KW. The motor room is equipped with separate series, shunt and compound-wound direct-current motors, together with a G.E. Co.'s 800 tramway motor; also with single-phase alternating-current induction and commutator motors, together with two and three-phase induction motors, all fitted with different types of absorption dynamometer for measuring H.P. and efficiency. The transformer room is equipped with electrolytic and rotary rectifiers, a three-phase transformer, a low-pressure Lowrie Hall converter, several high-pressure 2,000-volt transformers, and high and low-pressure condensers. The remaining laboratories are equipped with the most modern standards, and a large variety of other instruments, &c., met with in commercial



University of Leeds: Engine Room.

work. The cable jointing room is fitted with suitable stoves, tools, instruments and cables for practice in joint making. The University is lighted throughout by the electric light, the plant for which electrical engineering students take charge of and are responsible for during a complete week.

We illustrate also the engine room, which is equipped with a 70-H.P. Willans compound engine, a de Laval steam turbine, and a 30-H.P. compound steam engine and boiler, a set specially designed for experimental purposes, on the usual lines. In addition there is a large variety of minor apparatus, such as a separately fired McPhail & Simpson superheater, a 5-H.P. steam engine coupled to a 6-ft. Guibal fan, several other fans, oil, gas and petrol engines, centrifugal and reciprocating pumps, &c., and a complete equipment of testing and measuring apparatus. No attempt is made in this department to give instruction in the use of hand or machine tools, it being held that such work can only be properly done in engineering workshops.

It will be seen that engineering is already well provided for in the University, and when the equipment is completed it will be able to take its place in the front rank of such institutions. The Civil and Mechanical Engineering Department is under the control of Prof. Goodman, M.Inst.C.E.; while at the head of the department of Electrical Engineering is Mr. G. D. A. Parr, M.I.E.E., to whom we are indebted for kind assistance in preparing these notes. The photographs were taken by Chas. Pickard, Leeds.

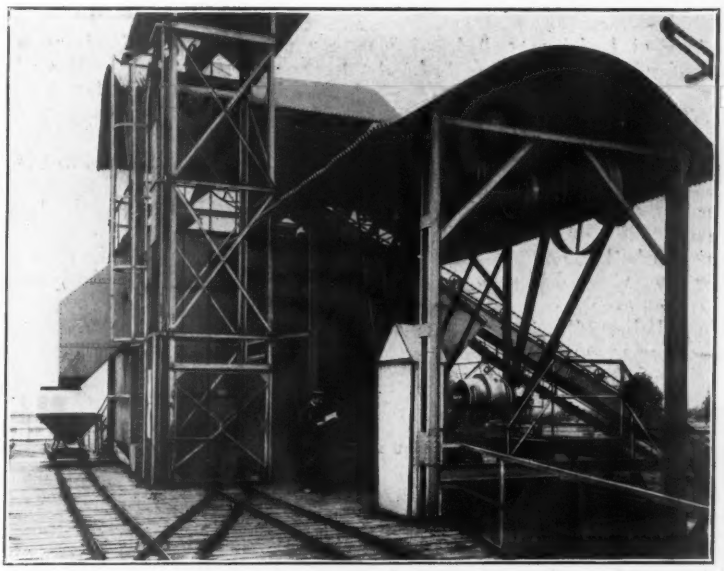


FIG. 1.—ELECTRICALLY-DRIVEN COKE-CRUSHING PLANT, GÖRLITZ GASWORKS.

ELECTRICITY IN A GERMAN GASWORKS.

[BY OUR BERLIN CORRESPONDENT.]

THE extent to which electricity is utilised by some gasworks, which were formerly the keenest competitors of electric power stations, is exemplified by the municipal gasworks recently installed in the city of Görlitz, Germany, where direct current, at 220 volts pressure, is generated in a special power house and distributed through a two-wire system. The installation comprises an extensive inside and outside lighting plant, covering the whole of the gasworks, in addition to a number of electric drives.

The electric power station contains two horizontal tandem steam engines, each of which has a normal output of 125 H.P., at 130 R.P.M., a maximum permanent output of 160 H.P. and a temporary overload of 190 H.P. These are run condensing, and coupled to direct-current dynamos of 110 KW. at 220—235 volts pressure, the armatures being mounted on the extensions of the crankshafts.

The boiler plant comprises four tubular boilers with a steam pressure of 12 kg. per sq. cm. A chimney cooler, installed beside the engine house, serves to cool the condensing water, the cooling water being raised by a centrifugal pump, operated by a direct-coupled 5-H.P. motor.

In addition to the boiler and engine rooms, the power house includes a building accommodating the water cleaners, and steam feed pumps. The engine room is of ample dimensions to accommodate a third steam dynamo, while space for two additional boilers has been provided in the boiler room.

The switchgear is arranged on a masonry pedestal on one of the short sides of the engine room, and comprises five panels; space for future extensions has also been provided. All fuses for upwards of 40 amperes are arranged behind the switchboard, where the shunt regulators of the dynamos, operated from the front by means of hand-wheels, are likewise fixed. The connections between the dynamos and the switchboard are of iron armoured cable, arranged below the ceiling of the engine house basement on a corrugated metal support.

The lighting plant comprises 125 incandescent lamps and 20 arc lamps, the latter being arranged in five circuits of four each, as follows:—Two arc lamps of 10 amperes each, in both the engine and boiler rooms; four arc lamps of

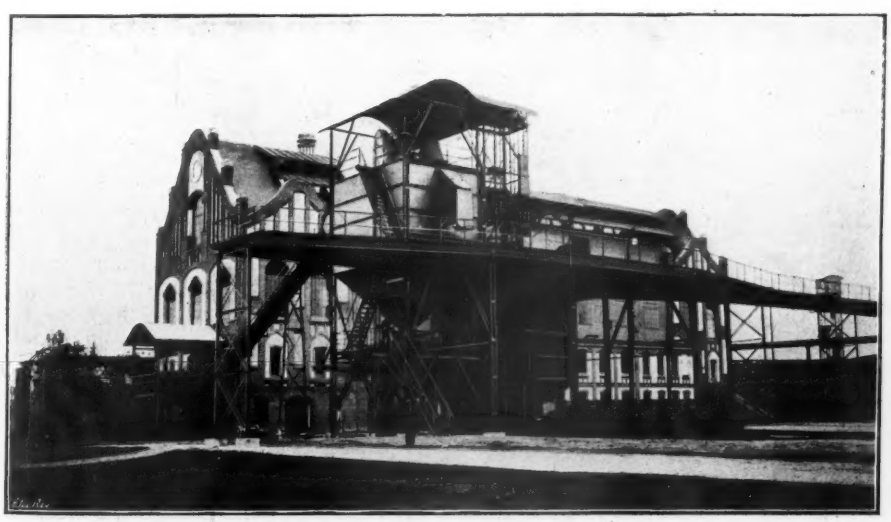


FIG. 2.—THE RETORT HOUSE, GÖRLITZ MUNICIPAL GASWORKS, SHOWING ELECTRICALLY-DRIVEN COKE-HANDLING PLANT IN FOREGROUND.

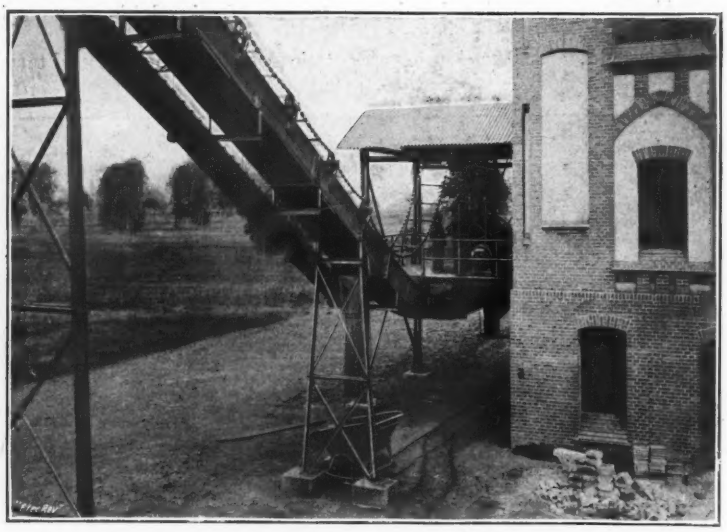


Fig. 3.—Coke Chute, with Electrical Drive.

10 amperes each in the coke yard; eight arc lamps of 8 amperes each in the retort house; and one arc lamp of 10 amperes for the coal-dressing plant, railway embankment, gas reservoir and power house respectively.

Electric motors have been used most extensively for the operation of the various auxiliary machines, to an aggregate of upwards of 100 H.P. The most important drives, for each of which a special motor has been provided, have the following capacities.

The coke elevating and hauling plant close to the retort house, 18 H.P. (fig. 2).

The coke chute in the retort house, 6 H.P. (fig. 3).

The coke chute of the coke-crushing and sorting plant, 17 H.P. (fig. 1).

The coke shaking sieve below the night reservoir, 2 H.P. (fig. 4).

The coke chute above the night reservoir, 5 H.P.; two coke elevators of 4 H.P. each; a high-pressure blower, 25 H.P. (fig. 5); a tar centrifugal and an air-pump in the ammonia room of 5 H.P. each, &c.

These motors which are protected on the top by corrugated sheet roofs, are of the entirely enclosed type (figs. 2 to 4), the starter and switchgear of each of them being located in a sheet-metal cupboard, fitted with sliding doors. The motor driving the air-pump in the ammonia room is likewise entirely enclosed, whereas that operating the tar centrifugal is surrounded by a ventilating housing, sufficient air being supplied through tubes.

Four main feeders branch off from the switchboard at the central station, two of which are intended for the lighting and two for the power supply. In addition to these, a number of auxiliary circuits have been provided, especially for the lighting of the power house and for some smaller motors.

The cables for the motors located in the neighbourhood of the retort house, especially those intended for the coke-crushing and sorting plant, as well as the lighting conductors supplying the retort house, have been arranged underground, and all the remaining conductors, in so far as they are situated outside the buildings, are fixed overhead.

Most of the cables running through the buildings are drawn into pipes, rubber insulation and steel-armouring being used in all rooms subject to the risk of explosion, in accordance with the regulations of the Association of German Electricians; all the switches and fuses are arranged outside those rooms. The lamps, which are fitted with porcelain bases, and enclosed globes, are screwed directly to the piping and the lamp pendants through the intermediary of gas-tight ball joints.

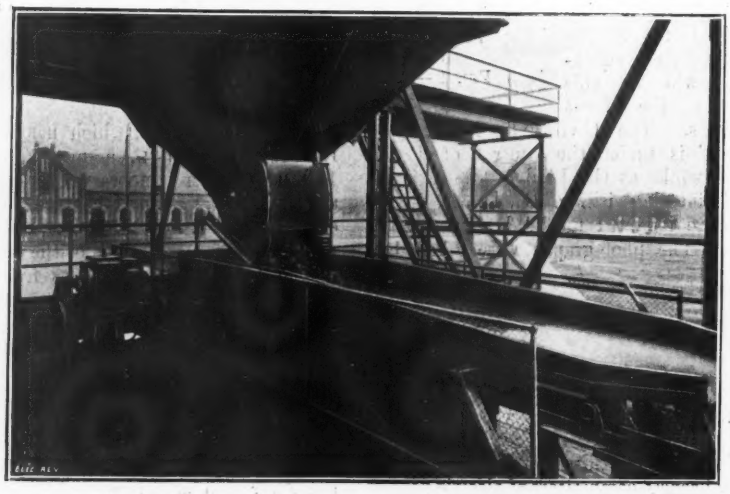


Fig. 4.—Coke Sieve with 2-H.P. Motor Drive, Görlitz Gasworks.

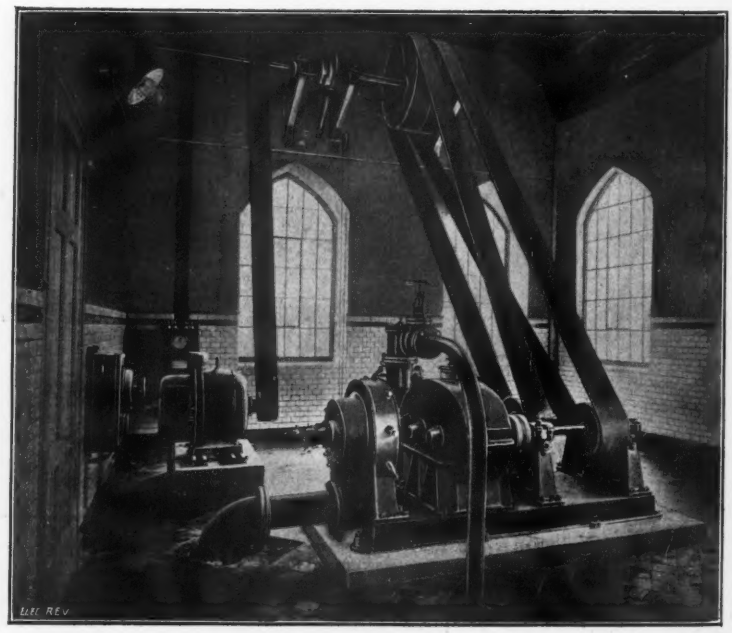


Fig. 5.—High-Pressure Blower, with 25-H.P. Motor and Switchgear.

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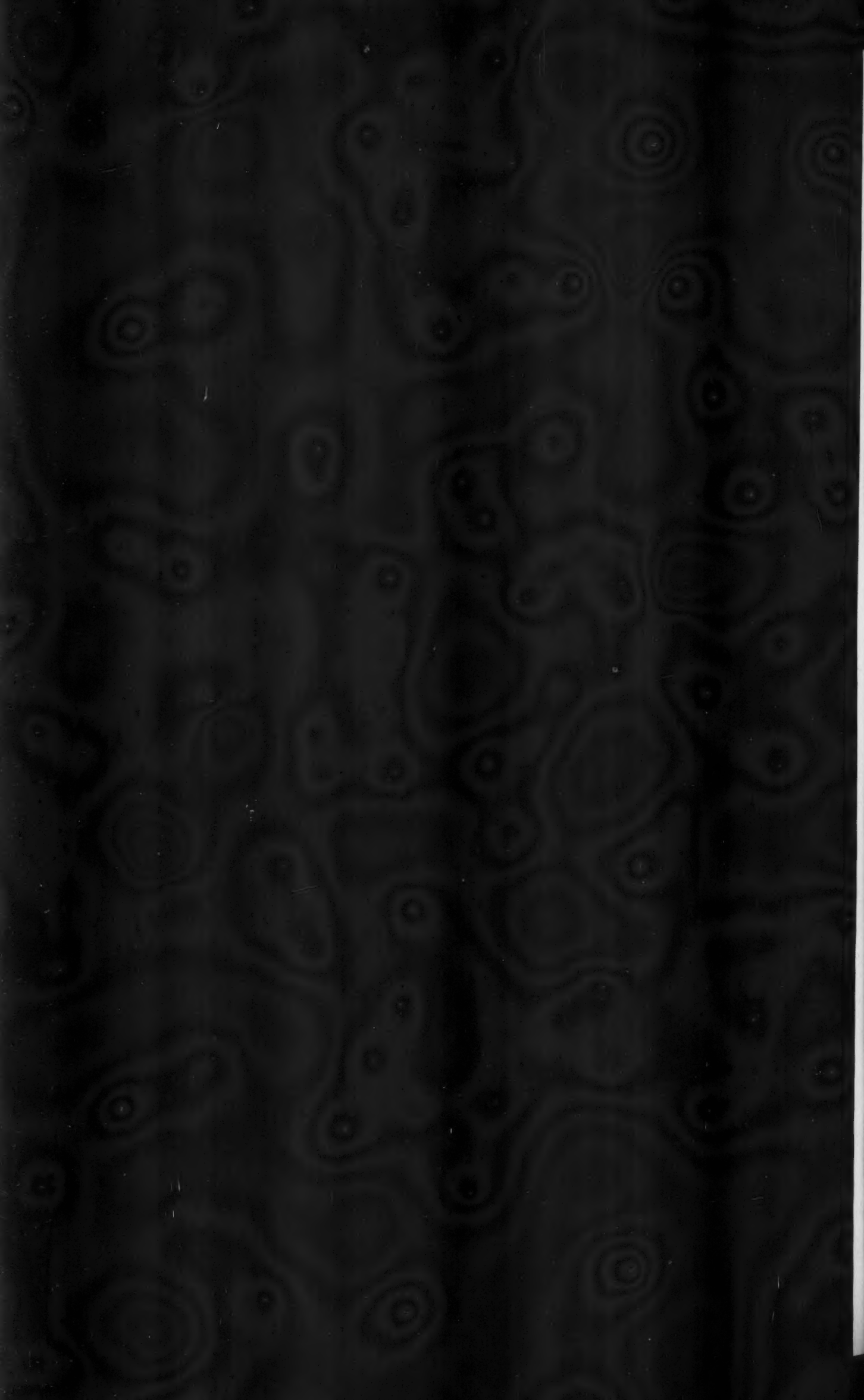


THE TEACHING OF ENGINEERING SCIENCE.

From time to time inquiries are held, papers are read and discussed, lectures are given before learned Societies, and Royal Commissions report, concerning the condition and systems of engineering education in the United Kingdom and abroad, and recommendations are made with a view to improving the training and bringing it more into line with modern requirements.

One of the first important inquiries on this subject was that made by the Institution of Civil Engineers in 1868, the results of which were published in 1870. In the year 1884 the Royal Commission on Technical Education issued a report in which the genesis of the technical school was shown to have been due to the fact that when the Continental countries began to emulate Great Britain in the construction of railways and other engineering works, they were faced by the problem that they had no engineers nor any means of training them. The following quotation from the report of the Royal Commission describes very clearly the birth of the engineering industry abroad and the establishment of the polytechnic system :—

"The beginnings of the modern industrial system are due in the main to Great Britain. . . . Thus when, less than half a century ago, Continental countries began to construct railways and to erect modern mills and mechanical workshops, they found themselves face to face with a full-grown industrial organisation in this country, which was almost a sealed book to those who could not obtain access to our factories.

"To meet this state of things, foreign countries established technical schools like the Ecole Centrale of Paris and the Polytechnic Schools of Germany and Switzerland. The buildings are palatial, the laboratories and museums are extensive, and the staff of professors is so numerous as to admit of the utmost sub-division of the subjects taught."

In 1891 the Institution of Civil Engineers again took up the subject of engineering training, and published a statement dealing very fully with the facilities for engineering education afforded at that time by the engineering schools of universities and colleges in the British Dominions.

Again, in 1903 at the "Civils" Conference in London, the subject was very fully discussed, and discussions took place also at meetings of the "Mechanicals," the Institute of Naval Architects, the North-East Coast Institute, and other societies, including the very thorough discussion of Dr. Walmsley's comprehensive paper on "Technical Education in America," read before our own Institution. These discussions showed that whilst there were wide differences of opinion as to what were the best methods of training engineers, there was a feeling that the subject should be thoroughly investigated and reported upon by a representative committee of the whole of the engineering societies. This general desire was put into concrete form in a letter addressed to the Institution of Civil Engineers by the Institution of Mechanical Engineers ; in consequence of this communication, a special committee was formed, including representatives from all the leading engineering societies to consider and report upon the best method of training for all classes of engineers.

Opinions in the form of answers to definite questions, were obtained from a large number of manufacturers, engineers, professors, and others interested in the subject, and a report issued in 1906 setting forth the conclusions arrived at by the Committee.

In the meantime, the North-East Coast Institute of Engineers and Shipbuilders, a society which is in very close touch with the local industries, had formulated a definite scheme of training for pupil apprentices and artisan apprentices, a scheme which was adopted in its general features by several of the leading shipbuilding and engineering employers. This scheme provided for scientific and technical training in addition to workshop experience, and a report has recently been presented to the Institute by Mr. W. G. Spence on the practical working of the system during the four years it has been in operation.

The latest important contribution to the subject is the inaugural lecture delivered before the University of Oxford on October 16th, 1908, by Mr. Charles Frewen Jenkin, the recently-created Professor of Engineering.

The lecturer took for his title "The Training for the Engineering Profession," and traced the development of engineering from Babylonian times, mentioning the work of the Egyptian, Chinese, and Roman engineers, down to the present time, when Englishmen occupied the proud position of following in the steps of the old Egyptian and Babylonian engineers in carrying on their work on the Nile, Euphrates, and Tigris.

The university training of engineers, the lecturer pointed out, had its foundation laid when Rankine was appointed to the Professorship of Civil Engineering and Mechanics in the University of Glasgow. He was followed by Fleeming Jenkin, the lecturer's father, in Edinburgh, by Kennedy in London, and Ewing in Cambridge. These men taught principles, not details of practice, and the college training was intended to be followed by a workshop apprenticeship. It is this type of training which it is proposed to give in Oxford University.

The other kind of teaching, namely, that given at our technical colleges, which, as already pointed out, is largely due to the copying of Continental and American practice, is, in Mr. Jenkin's opinion, a retrograde step. The schools abroad, he says, were built because foreign countries lacked what we possessed in the apprenticeship system. The modern technical colleges believe they can turn out trained engineers ; and that, in addition to theory, they can teach the experience formerly gained in the apprenticeship.

There can be no doubt that, unless checked, the tendency of technical colleges towards minimising the importance of the apprenticeship, will exert a very detrimental influence on the engineering industry of this country. The doctor cannot do without the hospital training in addition to the college training ; the sailor cannot learn navigation and seamanship in a college tank, but must go to sea ; so, also, must the engineer supplement his college training by a workshop apprenticeship.

The teaching, as it is to be carried on in Oxford University under Prof. Jenkin's guidance, will be partly bookwork, partly lectures, and partly experimental measurement taught in the laboratory. The laboratory will not be a model workshop ; it will not aim at teaching manual arts, but the art of measurement, and—to a few students, those born with a great natural aptitude for scientific inquiry—the methods of research.

Drawing will also be taught, and a workshop in connection with the measuring class is, the Professor thinks, a legitimate and almost necessary complement. Not a workshop for making things, as in a trading concern, but for adjusting, repairing and modifying the apparatus he requires. In some respects it would resemble the workshop of a practical optician. Surveying, too, will form part of the training.

A survey class will be organised during the long vacation, and the students will live in little country inns or under canvas on the Welsh, Northumberland, or Scotch hills. It is hoped also that the second year undergraduates will be able during the long vacation to devote some time to engine and boiler testing in the lavishly equipped mechanical laboratory of the Birmingham University.

At present there is no laboratory equipment at all for the engineering department in Oxford, and the only building provided is the Millard laboratory, a small and somewhat shabby affair. About £1,100 has been subscribed towards the initial expenses, with which Prof. Jenkin hopes to be able to get sufficient apparatus to make a start. Large and elaborate apparatus he considers to be not only unnecessary for an engineering laboratory, but he regards it as being apt to become a snare for both teacher and student. He recalls the words of Helmholtz in describing the great Faraday's equipment :—"A few wires and some old bits of wood and iron seem to serve him for the greatest discoveries." Clerk Maxwell, too, had to be content with "an old door set on two barrels, and two chairs, one of which is safe," set up in a garret above a warehouse, as the furniture for his workshop. The lecturer remembers also the dingy little class-room in Edinburgh in which his father taught, and the engineers who were trained there, so he

feels that Oxford students need not suffer from the roughness of the accommodation or the simplicity of the apparatus.

There is no doubt that Prof. Jenkin possesses the true scientific spirit, and we shall watch with interest the development of the engineering school at Oxford. We join with him in the hope that from among his students "shall go forth men to the ends of the earth who will gain new honours for Oxford, and blessings from fellahin for water in a thirsty land; from ryots for famine warded off; from crowded cities for health and comfort; from solitary dwellers in forest and mountain and veldt for roads and bridges."

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Railway Carriage Door Lock.

The accompanying illustrations show the arrangement of a new electrical lock for railway carriage doors, &c., patented by Mr. S. A. M. Rose, the inventor of the electric recording target recently described in our pages. The fundamental idea of the invention is to provide a controlling circuit which is not completed until the last door is closed, whereupon the locking mechanism of all the

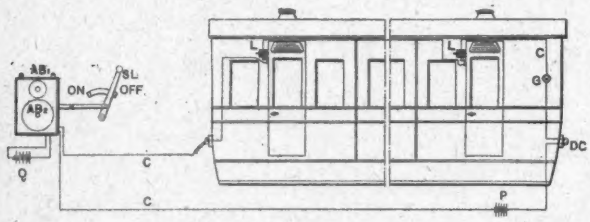


Fig. 1.

doors is automatically actuated, the starting gear of the train is released, and an audible signal is given to the driver. Any interruption of the controlling circuit, due to accident or design, is similarly announced to the driver, and all the doors are simultaneously unlocked.

The general arrangement is shown in fig. 1; figs. 2 and 3 show the electric lock, and fig. 4 shows the apparatus in the driver's cab. It will be noticed that the starting lever SL is interlocked with the apparatus, so that the driver cannot start unless all is in order; but this is not an essential feature of the system.

In fig. 1 CC is the locking circuit, LL are the locks, G a switch in the guard's van, by means of which the guard can open the circuit, DC a suitable dummy and coupling for prolonging the circuit through the next coach, P the main battery, Q an auxiliary battery, AB alarm bells in the cab. In fig. 2, A is the switch closing the circuit CC when the door is shut, actuated by a ball catch BC; SS are solenoids actuating the bolt B against the pull of the spring Y. The same letters are used in fig. 4, which also shows the connections in greater detail.

Following the last figure, it will be seen that when the starting lever is put in the "off" position, a sliding bar SB linked to it is pulled over to the right, and (if the circuit CC is interrupted) a pin drops by gravity into a socket, preventing its return. At the same time, one leg of the circuit to the alarm bell A B_1 is closed by the contact C_1. The bobbins R are in the circuit CC, and when this is closed they pull up their cores, releasing the sliding bar and closing the local circuit through the upper arm of the forked spring D attached to the armature, which completes the circuit from the battery Q through the bell A B_1, and thus informs the driver that all is ready for starting.

Directly the lever is moved towards the left, the bell circuit is interrupted at C_1, but a second circuit is closed through bell A B_2 by the sliding contact C_2; the bell does not ring, however, unless

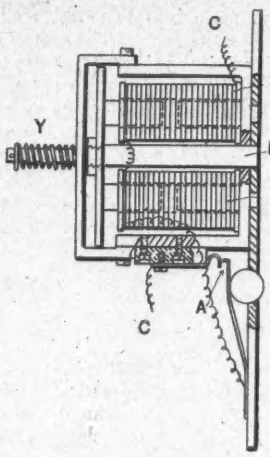


Fig. 2.

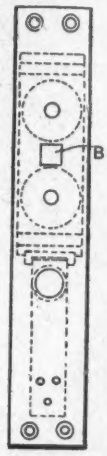


Fig. 3.

the circuit CC is broken, when the cores of bobbins R drop and the lower arm of the switch D completes the circuit through A B_2, giving the alarm to the driver. It will be noticed that the lever is locked only in the "off" position, and then only if the circuit CC is incomplete; in any other position it can be handled freely without interference with or from the electrical apparatus. Obviously, the electric circuit is available for use as an emergency alarm by simply providing a switch in each compartment. Should the train be parted by any means the alarm would at once be given.

It will be seen that quite a number of purposes are simultaneously served by this device. The need of a safety door lock is a want of long standing, and few people realise how many accidents have occurred through the lack of it—especially since the introduction of corridor coaches. Between October 24th and November 11th, for instance, no fewer than six such accidents took place—two of them fatal.

Wellman-Seaver Control Gear.

Messrs. Wellman, Seaver & Head, Ltd., have recently shipped a large order for controllers to an important steelworks on the Continent. This order, part of which we illustrate, comprised over sixty of their well-known Dinkey controllers, which they have

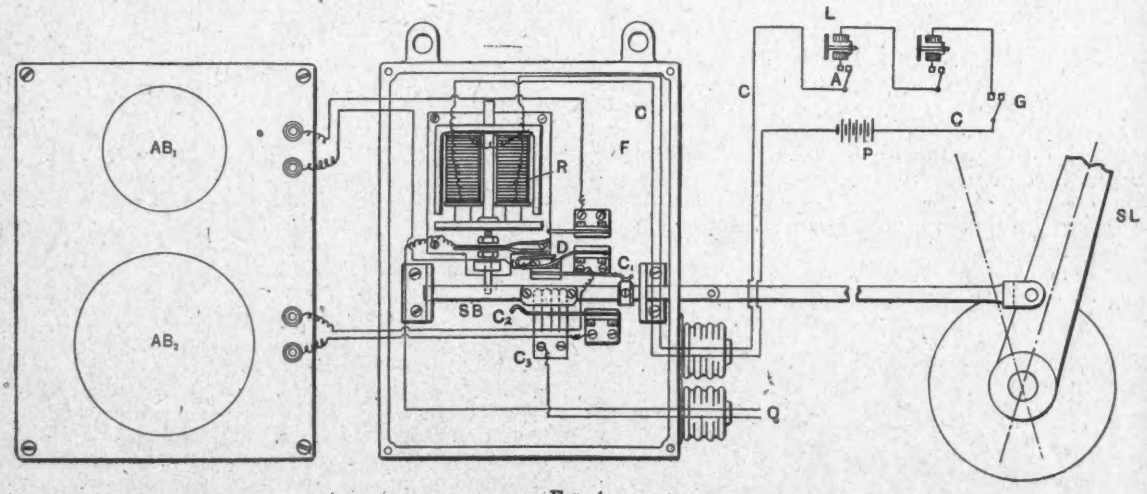
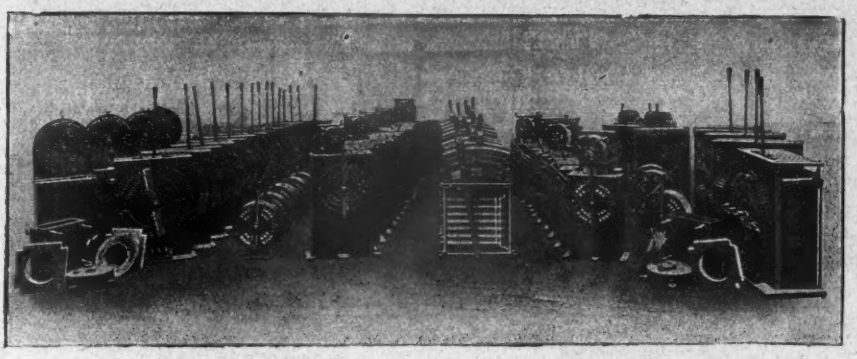


Fig. 4.

been manufacturing for some time now, for use on their steelworks machinery and other work.

These controllers are of the face-plate type and self-contained, and consequently the wearing portions can be made of ample area and also very readily renewable, while the connections to the motor are extremely simple. These points make it a most suitable controller for use in steelworks and on such services as screw-down gear, live rolls, skids, &c., and in connection with



Wellman, Seaver & Head Control Gear for a Continental Steel Works.

these it may be stated that Messrs. Wellman, Seaver & Head, Ltd., have completed a large order for Messrs. A. Hickman, Ltd., of the Staffordshire Steel and Iron Ingot Works, Bilston, Staffs., to whom they have supplied all the necessary auxiliary controllers and electric brakes for their new electrically-driven cogging mill and bar mill.

Two Wellman brakes are also shown in our view; and these, like the controllers, are specially designed for hard service. Both controllers and brake were illustrated by us in connection with the Manchester Exhibition.

The Wellman Co. are to be congratulated on their success in exporting this control gear to the Continent in face of the high protective tariff placed on such goods.

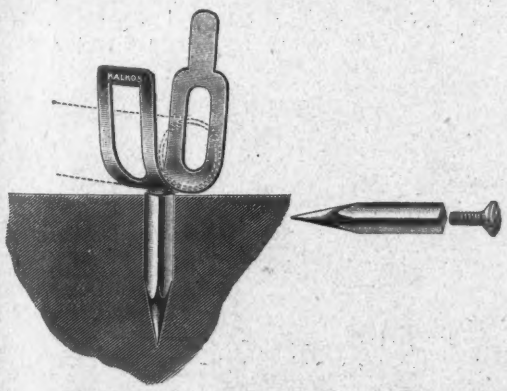
Buckle Clip for Conduit.

The Sun Electrical Co., Ltd., 118 and 120, Charing Cross Road, W.C., have introduced a new type of clip, in the form of a buckle, for fixing conduit to walls. On wooden surfaces a small wood screw is used to fix the buckle; on brick, &c., a hard steel

Method of Closing Buckle.

dowel pin is driven in, and the clip attached to it with a screw, as illustrated below. The clip is then closed over the tube, and when properly secured the conduit cannot be pulled down without pulling out the screw or the dowel pin.

The buckle, which was originally designed for "Kalkos" tubing, is supplied in various sizes to fit steel conduit, and is made of tough



Details of Buckle Clip and Dowel Pin.

brass, well tinned. In combination with the dowel pin, it provides a very quick and efficient means of fixing conduit.

Electric Shock Fatality.—An inquest was held on Tuesday concerning the death of Allen Wilcock (33) which occurred while he was employed at the Darklane Mine of the Mirfield Coal Co. It appears that while in charge of a coal-washing machine in the open air he climbed to adjust a sluice about 3 yards from the surface, and grasped a pull wire which became live through getting into contact with an electric wire. The jury, in giving their verdict, recorded the opinion that there had been a lack of systematic inspection of the wiring and a neglect of the special rule which provided that all electrical circuits must be completely insulated from earth, tested daily, and a record kept of such tests. They were also of opinion that it was a case of inexperience rather than of negligence.

CONTRACTORS' COLUMN.

(*Concluded from page 930.*)

SHEPSHED (Leicestershire).—Proposed new hosiery works for R. Walker and Sons, Rutland Street, Leicester.

SKEWEN (Neath).—New Independent Methodist Church. Secretary, Independent Methodist Circuit, Neath.

SKIPTON.—Probable re-erection (after fire) of Low Mill, for C. A. Rickards, Ltd., sewing cotton manufacturers.

SLOLEY (Norfolk).—New Independent Methodist School. Trustees.

SLOUGH.—Houses, Alexandra Road, for J. & W. Hibberd. Additions to residence for Rev. P. H. Eliot.

SOUTHEND-ON-SEA.—New theatre, Southchurch Road, for a private syndicate.

SPENNYMOOR (Durham).—New Miners' Institute (£4,000). Bolckow, Vaughan and Co., Dean Colliery, Ferry Hill, Durham.

STIRLING.—Extension of Royal Infirmary (£5,000). E. Simpson, architect, 16, King Street, Stirling. Villa and stable for R. W. Smith, coal agent.

STIRLINGSHIRE.—Rebuilding of licensed premises at Kersemill. Macluckie and Walker, architects, 15, Dumbarton Road, Stirling.

STOKE-ON-TRENT.—New Church Hall at Porthill (£1,100). A. R. Wood and Son, architects, Tunstall.

STONEHAVEN.—Fourteen new cottages in Victoria Street and Silver Gardens. P. & J. McMillan, architects, Aberdeen.

SURBITON.—Proposed new school, at Hook, for the Surrey Education Committee.

SUTTON.—Seven shops, Chalk Pit House Estate, High Street. H. R. G. Smallman, architect, 8, Queen Street, Cheapside, E.C.

SWANAGE.—Additions to Melton Lodge; Parson & Hayter, builders.

TEDDINGTON.—Extensive alterations to offices, Park Road, for Hughes, Sims & Bunn, auctioneers and estate agents.

THATCHAM (near Newbury).—Probable re-erection (after fire) of Colthrop paper mill, for Henry & Co.

THORNE (near Doncaster).—New premises for Doncaster Mutual Co-operative and Industrial Society, Ltd. H. Beck, architect, Doncaster.

THORNTON (Lancs.).—Houses, Thornton Gate, Robert Ross; West Drive, Henry Kirby; Lawsons Road, W. Almone; Church Road, James Wood.

TORQUAY.—Proposed extension of the Victoria Park Wesleyan Chapel.

TREGARON.—New elementary school at Bronant (£1,200). G. D. Lewis, North Parade, Aberystwyth.

TROON (Ayrshire).—Double villa (near golf course) (£1,400); Ballie Smith, Troon. Double villa (near golf course) (£1,300); Watson and Adams, Troon. Double villa (Bentinck Drive) (£2,000); M. Muir & Co., Troon.

TRURO.—Residence at Kenwyn, for Mrs. A. E. A. Vincent, Truro Vean, Truro. A. J. Cornelius, architect, Truro.

VENTNOR.—Improvements to the Pier Pavilion.

WALKDEN.—Proposed electrical equipment at Hope Mills. Messrs. E. Lane and Sons.

Houses in Kay Street, for the Walkden Co-operative Society.

WALSALL.—Important sewerage and sewage disposal works at Streetly, for the R.D.C. W. P. Young, surveyor and engineer, R.D.C. Offices, Rushall, Walsall.

WALTHAM CROSS (Nazeing).—New Congregational school and hall.

WATFORD.—Additions to laundry and stable, Southsea Avenue; C. Brightman & Son, builder, Queen's Road, Watford. Ten houses, Leavesden Road; Bracey & Clark, builders, 129, Leavesden Road, Watford. Victoria Senior Boys' School for Herts. County Council.

WEALDSTONE.—Addition to printing galleries at Kodak Works, for Kodak, Ltd., head offices, 57-61, Clerkenwell Road, E.C.

WELLINGBOROUGH.—Houses, Alma Street, for J. G. Hacksley, builder; Burrows Bush, for John Richardson; Melton Road, for E. A. Ball.

WELLS.—New Mission Room in Southover (£700). Rev. Preb. Beresford, St. Cuthbert's, Wells.

WHALEY BRIDGE.—New Council School for 320 schools, for Cheshire C.C.

WINCHESTER.—Proposed enlargement of St. Paul's Church (£2,000); Rev. C. H. Gould, rector. Offices, St. James' Street, for Hants C.C.

WISHAW.—Houses in Pother Street, for Jas. Weir, grocer, Carluke; houses in Caledonian Road, for Wm. Black, plasterer, Hill Street.

WOLSTANTON (Staffs.).—Briquette works, Knutton, for J. H. Ketley; timber store, Sparrow Terrace, for J. Cooke; two villas, Watlands Avenue, for J. Cooke; new lantern room, Dragon Square, for W. Hewitt.

WOMBWELL (Yorks).—Four houses and shop, Church Street Jump, for Mr. Higgins; ten houses and shop, Cemetery Road, Hemingfield, for Adam Taylor; proposed shop, Market Place, for Jas. Goodall, clothier.

WORCESTER.—New School (£6,000 or £7,000). City Architect, Worcester.

WORKSOP.—Houses (to be lit by electricity), Stubbing Lane. Foster & Mokes, builders.

WORSBOROUGH (near Barnsley).—Houses, High Street, Worsborough Dale, for Geo. Porter & Sons; Station Road, Worsborough Dale, for R. Chatterton.

WREMBURY (Cheshire).—Important alterations at parish church. Rev H. W. Bradley, vicar.

TRADGYNLAIS.—Proposed new police station for Brecknshire Standing Joint Committee.

FORTHCOMING EVENTS.

Physical Society.—Friday, November 27th. At 5 p.m. At the Royal College of Science, South Kensington.

Electro-Harmonic Society.—Friday, November 27th. At 8 p.m. King's Hall, Holborn Restaurant. Concert, Ladies' Night.

Rugby Engineering Society.—Saturday, November 28th. Visits to electric power stations in London. See "Notes" to-day.

Liverpool and District Electrical Association.—Saturday, November 28th. At 3 p.m. Visit to Birkenhead Electricity Works.

Institution of Electrical Engineers (Manchester Section).—Tuesday, December 1st. At 7.30 p.m. At the University, Manchester. Paper on "Transformers—Some Theoretical and Practical Considerations," by Messrs. A. P. M. Fleming and K. M. Faye-Hansen.

Institution of Electrical Engineers (Students' Section).—Wednesday, December 2nd. At 7.45 p.m. At the Library of the Institution. Paper on "Electrical Road Vehicles (other than Tramcars)," by Mr. S. M. Hills.

Civil and Mechanical Engineers' Society.—Thursday, December 3rd. At 8 p.m. At Caxton Hall, Westminster. Paper on "The Influence of Track upon Railway and Tramway Carriages," by Mr. J. Sutherland Warner.

Rontgen Society.—Thursday, December 3rd. At 8 p.m. At 20, Hanover Square, W. Paper on "Phenomena Observed in Electrical Currents of Continuous Oscillation," by Dr. H. Manders.

Siemens' Stafford Engineering Society.—Friday, December 4th. At 8 p.m. At the Siemens' Institute, Stafford. Paper on "Military Engineering," by Mr. H. G. Williams.

Institution of Electrical Engineers (Glasgow Local Section).—Tuesday, December 8th. Meeting at 207, Bath Street, Glasgow.

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

The following orders are issued:—

Monday, November 30th.—"A" Company. Infantry drill (recruits), 6 to 7 p.m. Technical drill, 7 to 10 p.m.

Tuesday, December 1st.—"B" Company. Technical drill, 6 to 8.30 p.m. Infantry drill, 8.45 to 9.45 p.m.

Thursday, December 3rd.—"C" Company. Infantry drill, 6 to 7 p.m. Technical drill, 7 to 10 p.m.

Friday, December 4th.—"D" Company. Infantry drill, 6 to 7 p.m. Technical drill, 7.15 to 9.30 p.m.

Tuesday, December 1st.—Medical inspection for recruits, 6.30 to 7.30 p.m.

Capt. J. H. S. Phillips will give a series of monthly lectures, commencing on December 1st, to all companies on first company night in each month. The Wednesday lectures to N.C.O.'s will still be continued.

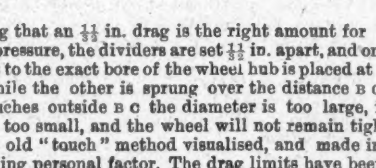
(Signed) J. H. S. Phillips,
Capt. and Acting Adjutant.

NOTES.

Water-Power in the Highlands.—Speaking of the possibilities of electric power from Highland lochs and rivers in his retiring address to the members of the Inverness Scientific Society, Mr. Alex. Newlands alluded to the large and successful business carried on by the British Aluminium Co. at Foyers, and their still larger works now being built at Kinlochleven, as instances of the successful application of water resources. He pointed out that, if the water from the catchment areas in the north was to be utilised to its full extent for power, it must be impounded and brought under control, as the rivers flowing out of those areas gave much too varying discharges to be successfully adapted for power purposes. No doubt many of their large rivers were capable, out of their relatively large ordinary flow, of being utilised for small powers, but if their full capabilities were to be utilised, impounding works must be resorted to. He did not seek to prove that there were immense possibilities in the Highlands in the shape of power from water, but he considered that power in small units was quite possible of development in the Highlands, and that in itself might yet be of no small moment in the history of the North of Scotland. The developing of such schemes would be governed entirely by the attitude of Highland proprietors to any proposals for the acquisition of water rights.

Electric Time Signals.—Direct electric communication has been established between the new Observatory at Lourenço Marques and the harbour works, and accurate time is transmitted automatically to a clock fixed on a tower erected near the pier for the convenience of mariners. There is also a periodic electric service of time from the Observatory to the station on the wharf, where a special apparatus has been fixed, consisting of rows of electric lamps visible at a considerable distance from three different directions. Exactly every three hours the electric current from the Observatory lights the lamps, which remain lighted for five minutes, and are then extinguished automatically, thus giving accurate time for adjusting ships' chronometers, both by night and by day. The apparatus is the only one of its kind in South Africa. It is on the lines of similar apparatus in use at Hamburg.—*Cape Times.*

Turning to "Caliper-drag."—An ingenious and satisfactory method of finishing the wheel-seats of axles so that wheels can be pressed on at the right pressure has been developed by the North-Western Elevated Railroad, Chicago. The shop foreman found, as most foremen have found in their time, that turning and boring to the "feel" of calipers is not a sufficiently reliable method, and we presume that at the same time he suffered from the frequently observed reluctance of fitters to give up the calipers for the simpler but new-fangled limit gauge; for he retains the old instrument of uncertainly approximate precision, and converts it without alteration into an instrument of much greater accuracy. The method can be shown best by referring to the sketches of a wheel-seat. The wheel having been bored to a certain finished and known diameter, and the seat having been turned down to a diameter safely larger than the wheel bore, the mechanic then sets out the "drag" limits on the seat with a straight edge and dividers.



Assuming that an $\frac{11}{32}$ in. drag is the right amount for the desired mounting pressure, the dividers are set $\frac{11}{32}$ in. apart, and one leg of the calipers set to the exact bore of the wheel hub is placed at a diametral point A, while the other is sprung over the distance B C = $\frac{11}{32}$. If the leg touches outside B C the diameter is too large, if it clears inside it is too small, and the wheel will not remain tight. This is simply the old "touch" method visualised, and made independent of the varying personal factor. The drag limits have been standardised from observation, and vary with the material of which the wheels and axles are made. For instance, when a steel wheel is to be pressed on to a steel or iron axle, at the pressure used by the company in question, the length of drag is said to be $\frac{1}{32}$ in. per inch diameter of the wheel fit, plus $\frac{1}{32}$ in. per inch of the wheel-seat; where cast-iron wheels are used, $\frac{1}{16}$ in. is taken instead of $\frac{1}{32}$ in.

Although we should prefer to see a proper limit-gauge system used, we admit that it is not easily applied to this kind of work, where from the nature of the conditions the wheel bore does not remain standard, and it may be easier to induce mechanics to use the drag system, in which there is no radical departure from their usual customs.

Penny-a-Word Telegrams.—Writing to the *Standard* of the 19th inst., Mr. E. Raymond-Barker protests against a statement attributed to Mr. Bradfield, manager of the Marconi Co., to the effect that the cable companies have neglected to keep abreast of the times, and that a signalling speed of only 25 words a minute is in vogue. Regarding the Pollak-Virag system, which is credited by Mr. Heaton with a speed of 400 words per minute through an Atlantic cable, Mr. Raymond-Barker remarks that a duly accredited record of such a feat would be an interesting item. In a letter to us, received too late for insertion this week, he points out that he wrote: "As one interested in the technical branches of submarine cable and wireless telegraphy, I notice with regret that partisans of the wireless section of this fascinating branch of applied science not infrequently underrate the performances of its elder-sister cable branch, in a manner by no means in accordance with facts"; but this paragraph was not published, and his letter was thus deprived of its emphasis.

Stoke-on-Trent Electricity Department.—In Wednesday's Parliamentary Papers, Mr. John Ward asked the President of the Local Government Board whether the Stoke-on-Trent Town Council had made formal application to his Department for sanction to borrow £7,555 to extend electrical mains to the district of Fenton for the supply of power to manufacturers and others; whether the Local Government Board had considered the same and the damage to the trade of the district which would result from unnecessary delay in providing energy; and what action, if any, it was proposed to take in the matter.—Mr. John Burns replied that the Town Council had made such an application. A local inquiry had been held, and the Town Council had been informed that any question of supply to Fenton should be deferred pending a settlement in regard to the federation of the Pottery towns. The Inspector reported that no evidence was brought forward at the inquiry to show the immediate necessity for a supply of electrical energy in Fenton, and he was advised that it was doubtful whether the capital expenditure contemplated with that object would prove remunerative.

Electric Lighting Companies' Audits.—In the House of Commons on Tuesday, a member asked the President of the Board of Trade whether, having regard to his promise to carefully watch the operation of the Board of Trade arrangements for the audit of the accounts of electric lighting companies, he had arrived at the conclusion that it was undesirable in the public interests that the same auditors should continue to act in the dual capacity of Board of Trade and shareholders' auditors; and, if so, whether, in view of the fact that the Board of Trade's own return showed that this practice was pursued in no less than 49 cases, he would consider the desirability of ending it in the new appointments that were about to be made. Mr. Winston Churchill replied in the affirmative, adding that he did not intend to appoint any of the shareholders' auditors to act as official auditors of the accounts of the same electric lighting companies for the present year.

Institution and Lecture Notes.—American Society of Mechanical Engineers.—The annual gathering of this Society takes place in New York from December 1st to 4th. The Presidential address of Mr. M. L. Holman will deal with "The Conservation Idea as applied to the American Society of Mechanical Engineers." Among the papers down for reading are the following:—

"The Engineer and the People," by M. L. Cooke.
"A Method of Obtaining Ratios of Specific Heat of Vapours," A. R. Dodge.
"The Total Heat of Saturated Steam," Dr. Harvey N. Davis.
"Fuel Economy Tests," C. R. Weymouth.
"An Automatic system for Firing Fuel Oil," C. R. Weymouth.
"Durability of Gears in Electric Railway Service," N. Litchfield.
"Liquid Tachometers," Amasa Trobridge.
"Training Workmen," H. L. Gantt.
"Reminiscences of a Gas Engine Designer," L. H. Nash.
"Possibilities of the Gasolene Turbine," Prof. F. C. Wagner.
"Tests on Friction Clutches for Power Transmission," Prof. Richard G. Dukes.

Rugby Engineering Society.—Through the courtesy of Messrs. J. S. Highfield, E. T. Ruthven Murray and J. P. Grove, the members of this Society will visit the undermentioned electric power stations to-morrow, Saturday afternoon:—Fisher Street sub-station of the Metropolitan Electric Supply Co.; Willesden Taylor's Lane generating station of the North Metropolitan Electric Power Supply Co.; Central London Railway generating station at Shepherd's Bush, W. The party will leave Rugby by the 12.42 p.m. luncheon car express, and will break up into two parties at Willesden Junction. Party No. 1, limited to 20 members, will journey to Euston, visiting Fisher Street sub-station, and will then have the option of returning to Willesden (for Taylor's Lane), or meeting party No. 2 at Shepherd's Bush (for the C.L. Railway station). Party No. 2 will leave the train at Willesden, and visit Taylor's Lane generating station of the N.M.E.P.S. Co., and the Central London Railway station at Shepherd's Bush. The visit to the National Physical Laboratory is postponed until next spring.

Electrical Football League.—The following matches take place to-morrow, Saturday:—Metropolitan Electric *v.* St. James' Electric, at Willesden; St. Pancras Electric *v.* County of London, at Swain's Lane, Highgate; Ediswan *v.* General Electric, Wormholt Farm. The kick-off in each case will take place at 2.45. A splendid game was the result of the meeting between representative teams of the above League, and the North-Eastern League at Leyton last Saturday. Twenty minutes from time the Electricals were leading by two goals to one, when their opponents equalised, and just on the finish scored a third goal, thereby bringing to a close any further interest in the London Inter-League Competition for this season.

Educational Notes. — University of London; University College.—The calendar for the session 1908-9 has recently been issued; it contains many new features, including a set of plans that show the uses to which the extension of buildings is being put. The new buildings have resulted in increased accommodation for each of the departments of the Faculty of Engineering. The calendar also contains a section setting forth in full the arrangements for Post-Graduate Courses of Lectures and for Research Work, which are very ample. It appears that there were no fewer than 229 Post-Graduate and Research students in the College last session. For the ordinary Undergraduate Courses composition fees have been instituted in all Faculties, so that students now know precisely the cost of their full courses before entering upon them.

The annual dinner of the Old Students' Association of University College will take place at the College on Monday, December 7th, under the presidency of Prof. J. T. Morris, a former engineering student, and it is hoped that many old engineering students will make a point of attending. The secretary for the dinner is Mr. B. Byles, B.Sc., 36, Hamilton Road, Harrow.

Gas Explosion.—A leak in the flange of the gasholder of a suction gas plant at an electric block station in Berlin recently caused an explosion whereby much damage was done to brickwork and plant. Walls were blown down, and the cover of the gasholder and the supply piping were hurled a distance of 11 m. Air is supposed to have entered the holder by the leak and mixed with the gas, which became ignited.

Parliamentary Applications.—Notices have appeared in the last two issues of the *London Gazette* of some electric lighting, power and tramway and railway schemes that are intended to occupy the attention of Parliament next session. We shall give particulars in the usual form as soon as the list is complete.

Appointment Vacant. — Electrical engineer for the Swansea Harbour Trust (£250). See advertisement pages to-day for particulars.

Street Lighting.—Fleet Street, E.C., which has hitherto been picked out with 36 double upright incandescent gas burners, is about to become (says the *Daily Mail*) the best illuminated piece of roadway in the world! It is, in fact, to be experimentally equipped with 16 inverted single incandescent burners, at a pressure of 56 in., most of them fixed to the house fronts, 4 ft. from the wall. This will be pleasant for pedestrians. The experiment arises, no doubt, from the disgust of the gas company at the contrast between the dim and not even religious light of Fleet Street, and the brilliant illumination of Holborn and Cannon Street by flame arcs.

Football.—On Thursday, November 19th, the L.C.C. Sub-stations Football Club (Southern Section), played the East London Railway Club, at Peckham Rye, and won by 6 to 3.

An Ilford Fittings Contract.—As we go to press, the Electrical Fittings Co., Ltd., of Conduit Street, W., write regarding the Ilford "Contract Closed" notice appearing in our last issue, stating that it is quite incorrect. "We never have done, and do not intend to do, installation work of any kind, and the contract we have received is simply for electric light fittings amounting to £112. We shall be glad if you will contradict your report at the earliest possible date." We are pleased to insert the foregoing correction.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the Electrical Review *posted as to their movements.*

Central Station Officials.—On Thursday evening, November 19th, a smoking concert was held at Hightown Hotel by the staff of the Electric Traction Department of the Lancashire and Yorkshire Railway, and a presentation was made to Mr. W. B. Packham, power station superintendent, who is leaving the company to take up an important post with the Calcutta Tramway Co., Ltd. The presentation, which was made by Mr. H. E. O'Brien, resident engineer, took the form of a gold stop-watch and a Perry slide rule.

On 23rd inst. the L.C.C. Tramways Southern Section sub-station staff gave a complimentary dinner to the retiring sub-station superintendent, Mr. F. Shorter, at Pinoli's Restaurant, Wardour Street, W.C. Mr. E. L. Pope, distribution engineer, southern section, presided, and presented Mr. Shorter with three silver fruit dishes on behalf of the officials and staff of the electrical section.

Mr. Hugh Purves has resigned the position of engineer-in-charge of the electrical and waterworks scheme of the Aliwal North Corporation, he having been appointed shift engineer at the Cape Town Corporation electricity works.

On Friday, November 20th, the members of the staff of the Loughborough Corporation electricity department presented Mr. W. Allcroft, who has completed his pupilship, and is leaving to take up an appointment with the Valvoline Oil Co., Ltd., at their Birmingham branch, with a combined letter wallet and pocket-book, fountain pen and pocket steel tape. The presentation was made by Mr. W. H. Allen, borough electrical engineer, on behalf of the staff, and Mr. Allcroft suitably responded.

General.—Mr. George Verity, chairman of Veritys, Ltd., left England on the 19th for India, Singapore, &c., on a combined business and holiday trip. He is due to return early in March, when he takes up his duties as High Sheriff for the County of London, an office which was held on a former occasion by his brother, the late Mr. John B. Verity.

Mr. H. H. Humphrey, of Belliss & Morcom, Ltd., was made the recipient of a cheque from the staff and employés of the Buenos Ayres and Pacific Railway Co.'s power station, Bahia Blanca, South America, on the occasion of his marriage with Miss M. Thompson.

Mr. S. D. Barnwell, resident engineer of the Buenos Ayres and Pacific Railway Co.'s power station, Bahia Blanca, South America, was also made the recipient of a cheque from the staff and employés on the occasion of his marriage with Miss A. Nodder, fourth daughter of Mr. and Mrs. S. J. Nodder, of Bahia Blanca.

Mr. John H. Woolliscroft, formerly with the Sandycroft Foundry Co, Ltd., Chester, has associated himself with Messrs. H. T. Boothroyd, Ltd., electrical engineers, of Bootle, Liverpool, as general manager; and the latter firm are now manufacturing, under licence, the Woolliscroft patent liquid starting and controlling gears.

Among the passengers on the Ellerman liner *Sardinia*, which was visited by so disastrous a catastrophe on Wednesday morning off Malta, were Mr. and Mrs. J. Grant and their son. Mr. Grant was proceeding to take up a position in the service of the Indo-European Telegraph Co. Everybody in general, and telegraph men in particular, will be eager to tender their heartiest congratulations to Mr. and Mrs. Grant on their escape, though these congratulations have to be accompanied with sympathy with them in the loss of their son by drowning.

Mr. E. Garcke announces that his address is now Electrical Federation Offices, Kingsway, London, W.C. The offices are situated over the Holborn Station of the Piccadilly and Brompton Railway at the corner of Holborn and Kingsway. Reference to the last annual report of the B.E.T. Co. (see Electrical Review, June 26th, 1908) will show that the British Electrical Federation consists of about 60 undertakings federated for co-operative purposes, the Council of which Federation is made up of the chairman or managing director of each of the federated undertakings. At the address mentioned, joint head office accommodation is to be provided for all the federated undertakings. The collective purchase of stores will be undertaken and the B.E.T. Mutual Insurance Fund is transferred to the Association.

The fourth annual dinner and concert of the Kensington and Knightsbridge Electric Lighting Co.'s Cricket Club was held at Addison Hall, Addison Road, Holland Park, W., on Saturday, 21st inst., the chair being taken by Mr. H. W. Miller and the vice-chair by Mr. R. S. Erskine. Mrs. Steuart Erskine presented the Electric Supply Cricket League Cup and Medals and the club prizes. A handsome commemorative cup, suitably inscribed, was presented to the club by Mr. Miller as a perpetual memento of their having won the League Challenge Cup. A neatly executed illuminated address was presented to Mr. C. L. Lichtenberg during the evening as a token of the appreciation of the club of his services and his captaincy of the "A" Eleven during the past four years.

NEW COMPANIES REGISTERED.

Robinson & Hands Electrical Co., Ltd. (100,349).—This company was registered on November 20th, with a capital of £1,000 in £1 shares, to carry on the business of manufacturers of and dealers in electrical and gas fittings and accessories, &c. The subscribers (with one share each) are:—A. C. Robinson, 54, Barwick Street, Birmingham, electrical engineer; W. C. Hands, 54, Barwick Street, Birmingham, electrical engineer. Private company: The number of directors is not to be less than two or more than five; the first are A. C. Robinson and W. C. Hands; qualification, 10 shares. Registered office, 54, Barwick Street, Birmingham.

Light Railway and General Construction Co., Ltd. (100,343).—This company was registered on November 20th, with a capital of £1,000 in £1 shares, to construct or acquire and turn to account light railways and tramways in the United Kingdom and abroad, &c. The subscribers (with one share each) are:—T. Stoker, C.S.I., 42, Egerton Crescent, S.W.; E. D. Cppert, Holme Lea House, Beckenham, Kent, retired foreign banker. Private company. The number of directors is not to be more than four; the subscribers are to appoint the first; no qualification required. Registered by Paines & Co., 14, St. Helen's Place, E.C.

Batley Electric Carbonising Co., Ltd. (100,350).—This company was registered on November 21st, with a capital of £20,000 in £1 shares, to carry on the business of waste pullers and carbonisers carried on by S. Butterfield, at Batley Carr, as the "Batley Waste Pulling Co." The subscribers (with one share each) are:—S. Butterfield, Stanley Mill, Batley, waste puller; G. H. Briggs, Blindwell Ings, Ossett, mungo manufacturer. Private company. The number of directors is not to be less than five or more than eight; the first are S. Butterfield, G. H. Briggs, H. Hey, I. Holmes and A. D. Smith; qualification, £100; remuneration, £5 per annum, divisible. Registered office, Bradford Road, Batley.

CITY NOTES.

Singapore Electric Tramways, Ltd.

The directors' report for the year ended December, 1907, states that the accounts show an excess of revenue over expenses of £26,222, against which has been charged debenture interest, depreciation and royalty £30,775, the loss for the year being £4,552. The latter part of the year 1907 was marked by a heavy depression in trade amongst all classes in Singapore, which was felt most severely by the Chinese, who constitute by far the largest portion of the community. This depression naturally had an adverse effect on the traffic receipts, notwithstanding which, compared with the 12 months ended December, 1906, the revenue in 1907 from tramway sources showed an increase of $96,262 76 and an increase of 3,271,094 passengers carried. Passenger receipts per car-mile have risen by 11·07 per cent., whilst the working expenses per car-mile have been decreased 3·05 per cent. The amount of energy for lighting and power purposes continues to show a gratifying increase, and the company is sparing no efforts to popularise the use of electricity. The proportionate percentage of increase in the supply in 1907 over 1906 was 173 per cent., and for the current year to August 31st, as compared with 1907, a further increase at the rate of 81 per cent. is shown.

On Wednesday, Sir Frank Swettenham presided over the meeting of this company held at the offices, 19, St. Swithin's Lane.

In moving the adoption of the report, the Chairman said that although it was not as satisfactory as last year's report, it contained many favourable points. It must be remembered that before they carried from the profit and loss account a debit balance of £4,552 to the balance-sheet, they had debited to that account £17,500 for debenture interests, and the very considerable charge on the undertaking of £12,975 for depreciation. The 10 new cars referred to in the report would be charged to the capital account. The company had lost £1,700 by the exchanging of the copper coins. That seemed a large sum, but he was informed that the Hong Kong Co. had lost from £3,000 to £4,000, in the exchanging of the coins. During the latter end of 1907 the passengers carried and the passengers' receipts had shown a falling-off as compared with the earlier part of the year. They had been informed that the falling-off was due to the general trade depression. The Governor of the Colony, however, had recently made a statement that the worst had been experienced, and it was reasonable to expect an improvement in the near future. There had been an increase in the passengers carried of 3,271,000, which must be regarded as satisfactory. The tramway revenue per car-mile was 7·41d. as compared with 6·51d., while the expenses per car-mile had decreased 3·05 per cent. By the installation of the new oil separator for the water, they hoped to effect a yearly saving of £450. The line from Orchard Road to Hotel de l'Europe had been completed. They would not, however, derive the full benefit from that until the line had been laid across the bridge over the Singapore River, the construction of which, they were informed, would be completed early in 1909. They had had to divert 1,700 yards of their line, due to the construction of a wet dock. He need hardly say that that expense had not fallen on the company. As they would remember, when the tramways were first started they provided for the carrying of two classes of passengers. That was discontinued for a while, but had since been resumed, and the result was sufficiently satisfactory to justify their keeping it on. The supply for power and lighting showed an increase in 1907 over 1906 of 173 per cent., whilst the supply for the eight months ending August last showed a still further gratifying increase of 81 per cent. The Singapore Tramway, Ltd., had been placed in liquidation, and the work of winding it up was almost completed, and the assignment of the mortgage had been handed over to their debenture-holders.

Sir Charles Petrie seconded the motion.

After a short discussion, the report was adopted.

Paignton Electric Light and Power Co.

A general meeting of this company was held on the 19th inst., Mr. W. J. Ham presiding.

The report showed that 6,295 shares had been allotted, the total amount received being £2,448.

In moving the adoption of the report, the Chairman remarked that they had gone in for what some people would describe as a speculation, but he believed it would turn out well for the company, as well as for the town. There had been an allotment of a small sum proportionate to their total capital in order to be able to begin earning something. The directors who started the company would remain in office until 1909, and he was perfectly certain that all would fall in with the suggestion that until the company was paying a dividend they would work, as they usually did in Paignton, for nothing.

Major-General Jackson seconded.

Dr. Purves, consulting engineer, said the work was being pushed on rapidly, and they might expect the light by Christmas Eve. The contractors were given four months to complete the work, and he believed it would be finished well within that time. A considerable amount of public lighting would be undertaken. It was important that a town like Paignton should have electric lighting, especially along the sea front. The company had entered into an agreement to erect a refuse destructor and destroy the refuse, which should prove a source of considerable revenue.

Mr. J. Kenny (solicitor) said the question of a site was not definitely settled, but he hoped it would be in the course of a day or two.

The Chairman said that negotiations were taking place for supplying current to the tramway company. The tramway company might set up their own machinery at Paignton, but that was not probable.

The report was adopted.

Official Announcements re Companies.

The following companies have been struck off the register, and are accordingly dissolved:—

Accumulator Syndicate, Ltd.
British Automatic Alarm Bell Co., Ltd.
Californian Electric Power and Mining Development Syndicate, Ltd
Dorchester and District Electric Supply Co., Ltd.
Electrograph, Ltd.
Forward Engineering Co., Ltd.
Kingsbridge and South Devon Electric Lighting and Traction Co., Ltd.
London and Swansea Patent Fuel Syndicate, Ltd.
New Mutual Telephone Syndicate, Ltd.
Patent Oil Fuel Burner Co., Ltd.
Priestman Oil Engine American Syndicate, Ltd.
Telemarken Development Syndicate, Ltd.
Variable Gears, Ltd.
"Vernon" Mechanical and Electrical Registers, Ltd.

The following are to be struck off within three months, unless cause is shown to the contrary:—

Aluminium Soldering Syndicate, Ltd.
British West African Rubber Concessions Syndicate, Ltd.
Electric Light and Power Co. of Japan, Ltd.
Electric Motive Power Co., Ltd.
Electro-Carbide Lamp Syndicate, Ltd.
Epstein Electric Accumulator Syndicate, Ltd.
Henry F. Joel & Co., and Thomas Potter & Sons United, Ltd.
International Power Co., Ltd.
London Electromobile Syndicate, Ltd.
Steam Packing and Engineers' Sundries Co., Ltd.
Tramway Share and Debenture Corporation, Ltd.
Welsh Electric Traction Co., Ltd.

Prospectuses.—*Brush Electrical Engineering Co., Ltd.*—On Wednesday the list was to close in £100,000 prior lien 5 per cent. debenture stock in this company, offered by Parr's Bank on behalf of Wheater, Cornwallis-West & Co., (in which firm one of the directors is a partner), at 95 per cent. The stock is specifically secured by a first mortgage in favour of the Electric and General Investment Co., Ltd., as trustees for the stockholders, upon the freehold and leasehold lands, buildings and fixed plant of the company at Loughborough, the estimated value for which, in the company's

books is £269,000. The stock is further secured by a third floating charge on the whole of the remaining assets of the company. The average profits for the four years ended December, 1905, were £34,609, but for the six years ended December, 1907, the average was reduced to £23,842; this reduction, according to the prospectus, was due to special items dealt with in 1906 and 1907 which are not likely to recur, including losses on the Australian branch (since closed), experimental work, and a strike of workmen. The interest on bank overdraft and temporary loans charged to the profit and loss account of 1907 amounted to £7,348, but in that year no provision was made for depreciation or doubtful debts, though £10,229 remains at the credit of the general reserve account. The proceeds of the present issue will be available for the reduction of these loans and for working capital. From statements in the prospectus it appears that, in addition to the primary security represented by the above first charge over lands, buildings, &c., there is the benefit of a floating security over the assets represented by £465,374.

We observe that the prospectus, as printed in the Press, names Lord Vaux of Harrowden as chairman of the company, Mr. W. L. Madgen as vice-chairman, and Mr. E. Garcke as one of the directors. Our readers will remember (see ELECTRICAL REVIEW, June 19th, 1908) that at the last annual meeting Lord Vaux announced his resignation of the chairmanship, though retaining a seat on the board. He also stated that Mr. Garcke, who had been intimately associated with the company in its former days, had consented to take a seat on the board and to accept the office of chairman, though not permanently. Presumably, judging from the present prospectus, his lordship has now been prevailed upon to retain the chairmanship, while Mr. Garcke merely holds a directorship of the company.

There is little doubt that the present issue is well secured, without taking into account such assets as £101,335 for shares and debentures in other companies, and £100,000 for patents and goodwill, which are items that one would like to look twice at. So far as the general position is concerned, if we deduct from the average profit of £23,842 an annual charge of £6,000 for interest and redemption on the now offered prior lien issue, there is £17,842 remaining to meet a required £11,250 for interest only on the first and second debenture stocks (4½ per cent.). To pay the preference dividend of 7 per cent. on £200,000 would require another £14,000, and the £140,976 ordinary shares need not be worried about as dividend-earners, for we should say that only a revolution could ever bring any dividend luck their way. If it is going to permanently help this long-troubled company out of its difficulties, we hope that it has received a good response to its prior lien offer.

Kuala-Klang Rubber Estate, Ltd.—7,500 shares (£1) in this company have been offered at par this week; 17,500 fully-paid shares are being issued as fully paid to the vendors, from whom the company acquires the Sungei Serdang Estate of 490 acres (70,000 trees, some of four years' planting) in the district of Klang, Selangor, Federated Malay States. The money realised from this issue will be employed in the discharge of a Government loan of £2,500, the rest being working capital, which is considered sufficient for bringing the rubber to maturity.

Electromobile Co., Ltd.—The report (according to the *Financial Times*) states that a mortgage of £20,000 has been arranged on the garage, and arrangements have also been made for the issue of £40,000 6 per cent. mortgage debenture stock, the holders of which have the option during a certain period to exchange their debenture stock for ordinary shares at par. A revaluation of assets has been made, which has enabled items amounting to £15,849 to be written off, and leaves a deficiency of £1,444 in the balance-sheet. At the general meeting resolutions were submitted for the increase of the borrowing powers to £100,000 and of the capital to £125,000 by the creation of 50,000 new ordinary shares of £1 each.

Castner-Kellner Alkali Co., Ltd.—The annual meeting was held on 19th inst. at Cannon Street Hotel. Mr. Gerald Balfour, who presided, said that the net profit was £115,528, about £900 less than in the previous year. Last year was one of considerable trade activity, but this year had been one of exceptional depression. Last year the price of coal was reasonably low, but this year exceedingly high. The extra price of coal would cover the difference in the profit several times over. After deducting debenture interest and interim dividend payment, £98,005 remained, out of which £30,000 was placed to depreciation reserve; £5,000 was written off suspense account, and £1,386 off plant account, representing loss on realisation of plant not now required; £12,500 was placed to a general reserve account, and £33,750 was payable as final dividend. £15,369 was to be carried forward. In regard to the future, he saw no reason why, in the coming year, they should not pay the same dividend as for the year now closed, which was 12½ per cent. for the year. They had converted the practice of paying a bonus to the responsible members of their staff into a regular system, and had extended that system to the workpeople as well. Every employé, whatever his grade, received a bonus after 12 months' service. The report was adopted.

Stock Exchange Notices.—Applications have been made to the Committee to allow the following to be quoted in the Official List:—

Montreal Water and Power Co.—Further issue of £28,900 first mortgage 4 per cent. prior lien gold bonds (registered), Nos. 1,823 to 2,000 and 2,701 to 2,811 of £100 each.

Anglo-Argentine Tramways Co.—Proposals for reorganisation of this company's share and loan capital have been circulated by the directors.

Compagnie Générale de Tramways de Buenos Ayres.—The report (as abstracted in the *Financial News*) states that the object in view from the formation of the company was the unification of the various tramway systems at Buenos Ayres. Having obtained the effective preponderance in various tramways, the company hopes during the year to amalgamate, as already authorised by the municipality, the Anglo-Argentine Tramways Co. with the Capital Traction and Electric Co. and the Buenos Ayres Grand National Tramways Co. The value of these transfers to the Anglo-Argentine Co. will be paid to the Compagnie Générale partly in third-class preference shares and partly in ordinary shares of the former company. When the fusion has been completed the various companies absorbed by the Anglo-Argentine Co. will go into liquidation. The total mileage controlled by the Compagnie Générale, which reached 300 miles on March 5th, 1907, now comprises 324 miles, with 1,350 motor-cars and 700 trailers. The accounts for the financial year show a profit balance of 3,936,037 fr. A dividend of 4½ per cent. per annum has been declared on 650,000 capital shares, leaving a balance of 4,235 fr. to be carried forward.

Fraser & Chalmers, Ltd.—The report for the year ended June 30th, 1908, states that the year's profit is £35,878, being £8,859 less than that of the preceding year, the falling off being due to extra expenses which have been involved by the establishment of new lines of manufacture at Erith. Apart from these extra expenses, the year's trading has been very satisfactory, and business has improved in South Africa, although competition is severe. At Erith the new turbine shop has been completed, and was equipped and put in operation early in 1908, although little material benefit could be derived from it for the 12 months ended June 30th. The total cost of this important addition to the works was about £60,000 up to June 30th. This sum, which includes all tools and other equipment, has been paid out of the undivided profits of past years, and has therefore not necessitated any increase in capital. The possession of this new shop will increase the possible output of the company when trade is active, and its erection was necessary in order to carry on and develop the manufacture of turbines. The directors recommend a final dividend of 4 per cent. on the ordinary shares, making 8 per cent. for the year, leaving £598 to be carried forward.

Tramway Company of Constantinople.—The *Financial News* Paris correspondent states that this company will shortly increase its capital from £T600,000 to £T940,000. Hitherto the chief voice in the affairs of the company has been held by the Continental Company for Electrical Enterprise at Nuremberg, but the control appears to be passing into Anglo-French hands; for it is reported that the banking firm of Messrs. A. Spitzer (whose close connection with Sir Ernest Cassel is known) have taken over the larger portion of the new shares. Moreover, the necessary material and plant for the electrification of the tramways will be supplied by French firms. The company's concession expires in 1992.

Isle of Thanet Electric Tramways and Lighting Co., Ltd.—The directors' report for the year ended September, 1908, states that the accounts show a profit of £13,391. The traffic receipts, owing to the inclement weather in August and September, show a decrease of £580, but the sale of electricity shows an increase of £237 as compared with the figures of last year. The past year was again free from any serious accident, and the directors have, in consequence, been able to renew the third party insurance for the year ending June, 1909, at a further reduction of £450. The amount of undivided revenue at the disposal of the directors is £5,516, and they propose to transfer £2,500 to reserve, bringing that account up to £5,500, and to pay a dividend of 1½ per cent. on the preference shares, leaving £1,141 to be carried forward. The provision of additional plant, in order to extend the lighting business of the company, is urgent, and an additional installation of electric plant, at an estimated cost of £7,500, is necessary to meet immediate and prospective requirements.

Geneva Tramways Co. (1906), Ltd.—The report for the year ended September 30th last, states that the profit and loss account of the Swiss company showed a profit on working for the year of 526,817.75 fr., to which must be added the credit balance of 310,467.75 fr. brought forward, making a total of 837,285.50 fr. After making provision for the necessary contributions to amortisation, renewal and reserve funds, including a special reserve of 300,000 fr. to meet capital expenditure, amounting together to 465,005.85 fr., there remained a balance of 372,279 65 fr., out of which a dividend of 1½ per cent., amounting to 300,000 fr., has since been paid, leaving 72,279.65 fr. to be carried forward.

Calcutta Electric Supply Corporation, Ltd.—The number of units delivered to consumers during the five weeks ended October 30th, 1908, were 681,268, compared with 644,573 units in the corresponding five weeks of 1907.

Amazon Telegraph Co., Ltd.—According to a financial daily the accounts for the year ended June 30th show an available balance, after providing for debenture interest, of £14,808 reducing a debit balance of £65,878 to £51,070.

American Westinghouse Reconstruction.—A Reuter dispatch from New York states that the Readjustment Committee has declared the reorganisation of the American Westinghouse Co. to be effective.

France.—La Société Industrielle d'Energie Electrique, o Paris, reports a net profit of £28,939 for the last financial year, a compared with £28,760 in the preceding 12 months.

MARKET QUOTATIONS.

Wednesday, November 25th.

CHEMICALS, &c.		Latest Price.	Fortnight's Inc. or Dec.
a Acid, Hydrochloric	per cwt.	6/-	..
a ,, Nitric	per cwt.	22/-	..
a ,, Oxalic	per cwt.	28/-	..
a ,, Sulphuric	per cwt.	5/6	..
a Ammoniac, Sal	per cwt.	42/-	..
a Ammonia, Muriate (crystal) ..	per ton	£33 10	..
a ,, ,, ...	per ton	e £30	..
a Bleaching powder	per ton	£5 10	..
a Bisulphide of Carbon	per ton	£18	..
a Borax	per ton	£16	..
a Copper Sulphate	per ton	£21	..
a Lead, Nitrate	per ton	£24	£1 dec.
a ,, White Sugar	per ton	£23	10/- dec.
a ,, Peroxide	per ton	£29	..
a Methylated Spirit	per gal.	2/6	..
a Potassium Bichromate, in casks	per lb.	5½d.	..
a Potash, Caustic (76/80 %) ..	per ton	£30	..
a ,, Chlorate	per lb.	8½d.	..
a ,, Perchlorate	per lb.	9d.	..
a Potassium Cyanide	per lb.	7d.	..
a Shellac	per cwt.	100/-	..
a Sulphate of Magnesia	per ton	£4 10	..
a Sulphur, Sublimed Flowers ..	per ton	£6 10	..
a ,, Recovered	per ton	£5 10	..
a ,, Lump	per ton	£5	..
a Soda, Caustic (white 70 %) ..	per ton	£10 10	..
a ,, Chlorate	per lb.	3½d.	..
a ,, Crystals	per ton	£3 5	..
a Sodium Bichromate, casks ..	per lb.	3d.	..
a ,, Cyanide (basis 100 %) ..	per lb.	7d.	..
METALS, &c.			
b Aluminium Ingots, in ton lots ..	per ton	£70	..
b ,, Wire, in ton lots ..	per ton	£112	..
b ,, Sheet, in ton lots ..	per ton	£120	..
c Babbitt's metal ingots	per ton	£50 to £140	..
c Brass (rolled metal 2" to 12") basis	per lb.	8d.	..
c ,, Tube (brazed)	per lb.	9d.	..
c ,, ,, (solid drawn)	per lb.	8d.	..
c ,, Wire, basis	per lb.	7d.	..
c Copper Tubes (brazed)	per lb.	9¾d.	..
c ,, ,, (solid drawn) ..	per lb.	9¼d.	..
g Copper Bars (best selected) ..	per ton	£77	£2 dec.
g Copper Sheet	per ton	£77	£2 dec.
g ,, Rod	per ton	£77	£2 dec.
c ,, (Electrolytic) Bars ..	per ton	£66 10	..
c ,, ,, Sheets ..	per ton	£?3	..
c ,, ,, Rod ..	per ton	£71	..
c ,, ,, H.C. Wire	per lb.	8¾d.	..
f Ebonite Rod	per lb.	3/3	..
f ,, Sheet	per lb	3/-	..
n German Silver Wire	per lb.	1/6	..
h Gutta-percha, fine	per lb.	5/6 to 6/6	..
h India-rubber, Para fine	per lb.	5/2	1d. dec.
i Iron Pig (Cleveland warrants) ..	per ton	49/-	1/- dec.
l ,, Wire, galv. No. 8, P.O. qual.	per ton	£14	..
g Lead, English Ingot	per ton	£13 15 to £14	5/- dec.
m Manganin Wire No. 28	per lb.	8/-	..
g Mercury	per bot.	£8 9 to £8 10	..
d Mica (in original cases) small ..	per lb.	6d. to 1/-	..
d ,, ,, ,, medium	per lb.	2/6 to 4/-	..
d ,, ,, ,, large ..	per lb.	4/6 to 8/6	..
p Phosphor Bronze, plain castings	per lb.	1/0½ to 1/2	..
p ,, ,, rolled bars & rods	per lb.	1/2½ to 1/3½	..
p ,, ,, strip & sheet	per lb.	1/3 to 1/6	..
e Platinum	per oz.	84/-	..
e Siliçium Bronze Wire	per lb.	9½d.	..
r Steel, Magnet, in bars	per ton	£55	..
g Tin, Block (English)	per ton	£135 to £136	£2 10 dec.
n ,, Wire, Nos. 1 to 16	per lb.	1/10	½d. dec.
p White Anti-friction Metals—			
"White Ant" brand	per ton	£35 to £60	..
k Zinc, Sh's (Vieille Montagne bnd.)	per ton	£24 15	..

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d F. Wiggins & Sons.
e Frederick Smith & Co.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakspeare.
h Edward Till & Co.
i Bolling & Lowe.
k Morris Ashby, Ltd.
l Richard Johnson & Nephew, Ltd.
m W. T. Glover & Co., Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p The Phosphor Bronze Co., Ltd.
r W. F. Dennis & Co.

Southport and Lytham Tramroad Co.—This company, which was formed nine years ago with the object of linking together Southport and Blackpool by a tram system, is shortly to be wound up. In the ensuing session of Parliament application will be made to release the company from all liabilities, penalties and forfeitures in respect of the non-construction of the tramway. Originally the company intended to construct a tram route from Banks, across the Ribble to Lytham, and thence to Blackpool; but objections from the Port of Preston and landowners on each side of the estuary necessitated the promotion of three Acts of Parliament for extensions of time, which swallowed up the major portion of the authorised capital, and has resulted in the project being eventually abandoned.

Reduction of Capital.—*Alliance Electrical Co., Ltd.*—A petition for confirming a reduction of capital from £120,000 to £60,000 is to be heard in the Chancery Division on December 15th.

STOCKS AND SHARES.

Tuesday Afternoon.

Rivers of water have run under the bridges since last we had the pleasure of chronicling such a list of rises in price amongst London electrical supply shares, as that which has occurred during the past week. The defeat of the London and District Electricity Bill has encouraged the market more than might have seemed possible for anything to do, and the advances in value are by no means trivial. Dull as other departments in the Stock Exchange are at the present time, the electrical section stands out in illuminated contrast to the heaviness elsewhere.

The failure of the London and District Electricity Bill is regarded as being a quietus to further attempts in this direction for some time to come. Only the lawyers have made money out of the various efforts hitherto exerted for supplying the Metropolis with cheap power, and the opinion is voiced in the Stock Exchange to the effect that promoters will now be content to give the scheme a prolonged rest.

In 1931, of course, local authorities possess the power to take over most of the undertakings, and it is held as not unreasonable to suppose that the remainder of their term of existence is likely to be passed in peace by the companies, unless the authorities should decide to take them over earlier, in which case a pecuniary solatium would, no doubt, be offered.

Rises amongst the London shares range from 2s. 6d. to 17s. 6d., the latter gain being secured by the Metropolitan Electric Ordinary. Bromptons rallied to the extent of 7s. 6d., and City of London and County of London Ordinary to the tune of 10s. apiece. Charing Cross Ordinary put on 7s. 6d., and Chelsea shares, which for some while past have been difficult to sell at 3, or even a little under, came into demand at about 3¼. London Electric Preference are 8s. 9d. to the good, Westminsters 5s. and St. James' the same. There is, indeed, a market again in electric lighting shares, with quite a deal of business doing in them. People begin to think, or to realise, that electricity supply shares yield very good interest on the money, and the sudden recognition of this has produced a salutary effect upon prices and upon trade in the shares.

The strength of these issues has done nothing to help prices in the manufacturing division. Electric Construction Preference were marked down a trifle. Brush Debenture stocks are practically unmoved at the offer of prior lien debenture advertised early this week. Edison and Swan Second Debenture is again a point to the good.

Anglo-Argentine Trams derived strength, and a good deal of activity, from publication of the scheme for reorganising the company's capital. The details received favourable attention in the market, where the prices of both classes of Preference shares and of the 6 per cent. Debenture Stock were advanced. Other tramway and traction varieties are quiet. British Columbia Preferred shed its small rise. British Electric Tractions are, actually, without alteration, although the nominal quotation for the shares is rather narrower.

The "Canadian group" continues to be active, Mexican Light and Power Common reacted a little, but the 7 per cent. Preferred shares rose 3½ points. Mexico Tramways lost 4, a natural reaction after its gay advance, and Rio Trams at 79¼ showed ¼ decline. Canadian General Common shares are 3½ better at 111, the Preference keeping about 114.

Telegraph stocks and shares are featured mainly by a further fall of 10s. in Eastern Extensions, of which there appears to be a large parcel about for sale just now. The quotation has got down to 11⅝. Eastern Telegraph stock slipped back 2 points, bringing it to 133½, which is still much higher in proportion than Eastern Extension shares are. Sir Henniker Heaton is the present skeleton in the market cupboard. Western Telegraphs lost ⅜, West India and Panama ⅛, and the recent weakness in the Telegraph catalogue has led to Globe Ordinary and Preference falling 2s. 6d. each Mackay shares retain their sharp rise of last week, but Marconi's are back to 10s. The Anglo-American group tended to go a trifle easier. In Telephones there has been little doing. National Preferred and Deferred fell ½ each on the notice in Monday's *Gazette* relating to the appointment of arbitrators at the end of 1911.

Telegraph Constructions are easier, while India-Rubber, Gutta-Percha shares hold their previous price. Rubber shares have fallen off to some extent, business in them being less active. Dick, Kerr Ordinary shares slightly hardened.

Home Rails are an idle and a dull market. Central London Ordinary is down 2, and City and South London 1. Metropolitan Consolidated and Metropolitan Districts are both a little lower. Underground Electric Railways issues have eased off, but for the 4 per cent. Debenture stocks of the different Tube Railways there is still a steady investment inquiry.

SHARE LIST OF ELECTRICAL COMPANIES.

TELEGRAPH AND TELEPHONE COMPANIES.

Present Issue.	NAME.	Stock or Share. *	Dividends for the last four years. 1904.	1905.	1906.	1907.	Closing Quotations Nov. 17th.	Closing Quotations Nov. 24th.	Business done week ended Nov. 24th, 1908. Highest.	Lowest.	Rise + or Fall −	Present Yield per cent. £ s. d.
25,000	Amazon Telegraph Co.'s shares, Nos. 1 to 25,000	10	Nil	Nil	Nil	Nil	2 1/4 — 2 1/2	2 1/4 — 2 1/2	52/6	50/-	..	Nil.
136,700	Do. do. 5 % Debs., Nos. 1 to 1,360 Red.	100	Nil	5 %	5 %	5 %	90 — 93	90 — 93	..	..	..	5 7 6
$131,551,400	American Telephone & Telegraph, Cap. Stock ..	$100	7 1/2 %	7 1/2 %	8 %	8 %	134 —137	134 —137	..	..	..	5 16 10
$53,000,000	Do. Collat. Trust, 4% Bonds, 1 to 28,000 and 53,001 to 78,000	$1000	4 %	4 %	4 %	4 %	94 — 96	94 — 96	..	..	..	4 3 4
598,180	Anglo-American Telegraph	Stock	2 3/4 %	3 1/4 %	3 7/8 %	3 1/4 %	58 — 61	58 — 61	..	..	..	5 14 9
3,200,910	Do. do. do. 6 % Pref.	Stock	5 1/2 %	6 %	6 %	6 %	102 —103	102 1/2 —103 1/2	103 1/2	102 3/8	+ 1/2	5 15 11
3,200,910	Do. do. do. Deferred	Stock	Nil	1 1/2 %	12 1/2 %	1 %	17 3/8 — 17 7/8	17 3/8 — 17 3/4	17 11/16	17 1/16	..	5 16 9
50,000	Anglo-Portuguese Tel., 5 % Mort. Deb. Stock Red.	100	..	5 %	5 %	5 %	100 —102	100 —102	..	..	..	4 18 0
44,000	Chili Telephone, Nos. 1 to 44,000	5	8 %	8 %	8 %	8 %	8 — 8 1/4	8 — 8 1/4	..	..	..	4 14 1
2,883,376	Commercial Cable Sting. 500 year 4 % Deb. Stk. Red.	Stock	4 %	4 %	4 %	4 %	89 — 91	88 1/4 — 90 1/2	89 1/2	89	— 1/2	4 8 5
16,000	Cuba Telegraph	10	5 %	5 %	5 %	6 %	7 1/2 — 8 1/2	7 1/2 — 8 1/2	..	..	..	7 1 2
6,000	Do. 10 % Pref.	10	10 %	10 %	10 %	10 %	16 1/2 — 17 1/2	16 1/2 — 17 1/2	..	..	..	5 15 11
12,931	Direct Spanish Telegraph, Ord.	5	4 %	4 %	4 %	4 %	3 — 3 1/2	3 — 3 1/2	..	..	..	5 14 3
6,000	Do. do. 10 % Cum. Pref.	5	10 %	10 %	10 %	10 %	8 — 9	8 — 9	..	..	..	5 8 1
30,000	Do. do. 4 1/2 % Debs.	50	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	100 —103	100 —103	..	..	..	8 14 10
60,710£	Direct United States Cable	20	3 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	13 1/4 —13 3/4	13 1/4 — 13 3/4	13 1/4	..	..	6 2 6
50,000£	Direct W. India Cable, 4 1/2 % Reg. Deb., 1 to 1,300, R.	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	101 —103	100 —102	..	..	..	4 7 5
4,000,000	Eastern Telegraph, Ord. Stock	Stock	7 %	7 %	7 %	7 %	134 —137	132 —135	135 1/2	132	—2	5 3 8
3,000,000	Do. 3 1/2 % Pref. Stock	100	3 1/2 %	3 1/2 %	3 1/2 %	3 1/2 %	84 — 86	84 — 86	85 1/2	84 1/2	..	4 1 5
1,896,706	Do. 4 % Mort. Deb. Stock. Red. ..	Stock	4 %	4 %	4 %	4 %	103 1/2 —105 1/2	103 1/2 —105 1/2	103 1/2	..	..	3 17 8
300,000	Eastern Extension, Australasia, and China Tele.	10	7 %	7 %	7 %	7 %	11 1/4 — 12 1/8	11 1/8 — 11 1/4	11 1/2	11 1/2	— 1/2	5 17 11
752,400	Do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	101 —103	101 —103	102 1/2	102	..	3 17 8
269,700	East & S. Afric. Tel., 4 % Mt. Db., 1 to 3,000, red. 1909	100	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
200,000£	Do. 4 % Reg. M. Debs. (Mauritius Sub.) 1 to 8,000	25	4 %	4 %	4 %	4 %	99 1/4 —101 1/2	99 1/4 —101 1/2	..	..	..	3 18 10
181,127	Globe Telegraph and Trust	10	5 3/8 %	5 1/4 %	5 1/4 %	5 1/2 %	10 1/2 — 11	10 1/8 — 10 5/8	10 3/4	10 5/16	— 1/8	5 10 1
181,127	Do. do. 6 % Pref.	10	6 %	6 %	6 %	6 %	13 1/2 — 13 7/8	13 1/2 — 13 3/4	13 3/4	13 1/2	— 1/8	4 7 3
150,000	Great Northern Telegraph, of Copenhagen ..	10	24 %	24 %	20 %	20 %	30 — 32	30 — 32	30 3/8	30 1/8	..	6 5 0
19,600£	Halifax and Bermudas Cable, 4 1/2 % 1st Mort. Debs., within Nos. 1 to 1,200, Red.	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	101 —103	101 —103	..	..	..	4 7 5
17,000	Indo-European Telegraph	25	18 %	18 %	18 %	18 %	56 — 59	56 — 59	..	..	..	5 2 7
$41,380,400	Mackay Companies Common	$100	1 %	2 %	3 1/2 %	4 %	78 — 82	78 — 82	..	..	..	4 17 7
$50,000,000	Do. do. 4% Cum. Pref.	$100	4 %	4 %	4 %	4 %	70 — 74	70 — 74	..	..	..	5 8 1
594,190	Marconi's Wireless Telegraph	1	Nil	Nil	Nil	Nil	1/4 — 3/8	1/4 — 3/8	10/3	10/-	..	Nil
72,680	Monte Video Telephone Co., Ltd. Ord.	1	4 %	5 %	6 %	6 %	1 1/16 — 1 1/8 xd	1 1/16 — 1 1/8	..	..	..	5 12 11
86,492	Do. do. do. 5 % Pref.	1	5 %	5 %	5 %	5 %	3/4 — 13/16 xd	3/4 — 13/16	..	..	..	5 3 11
2,225,000	National Telephone, Pref. Stock	100	6 %	6 %	6 %	6 %	109 — 111	108 1/2 —110 1/2	109 1/2	109 1/2	— 1/2	5 8 7
2,725,000	Do. do. Def. Stock	100	5 %	5 %	5 %	6 %	117 —119	116 1/2 —118 1/2	118 1/2	117 1/2	— 1/2	5 1 3
15,000	Do. do. 6 % Cum. 1st. Pref.	10	6 %	6 %	6 %	6 %	10 1/2 — 11 1/2	10 1/2 — 11 1/2	..	..	..	5 6 8
15,000	Do. do. 6 % Cum. 2nd Pref.	10	6 %	6 %	6 %	6 %	10 1/2 — 11 1/2	10 1/2 — 11 1/2	..	..	..	4 8 11
250,000	Do. do. 5 % Non-cum. 3rd P., 1 to 250,000	5	5 %	5 %	5 %	5 %	5 7/16 — 5 1/2	5 7/16 — 5 1/2	5 1/2	..	..	4 7 1
2,000,000	Do. do. 5 1/4 % Deb. Stock Red. ..	Stock	5 1/4 %	5 1/4 %	5 1/4 %	5 1/4 %	98 —100	98 — 100	98 1/2	98	..	3 10 4
1,716,598	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	101 —103	101 —103	101 1/2	..	..	3 17 8
179,313	Oriental Telep. and Elec. 1 to 171,504, fully paid ..	1	6 1/2 %	7 %	7 %	8 %	1 1/2 — 1 3/4	1 1/2 — 1 3/4	25/-	..	..	5 16 4
50,000	Do. do. do. 6 % Cum. Pref.	1	6 %	6 %	6 %	6 %	1 1/4 — 1 1/2	1 1/4 — 1 1/2	..	..	..	4 16 0
99,100	Do. do. do. 4 % Red. Deb. Stock ..	100	..	4 %	4 %	4 %	90 — 93	90 — 93	..	..	..	4 6 0
99,400	Pacific & European Tel., 4 % Guar. Debs., 1 to 1,000	10	4 %	4 %	4 %	4 %	101 —103	101 —103	..	..	..	3 17 4
11,839£	Reuter's	8	5 %	5 %	5 %	5 %	7 — 8	7 — 8	7	..	..	5 0 0
99,100	Telephone Co. of Egypt, 4 1/2 % Deb. Red.	100	..	4 1/2 %	4 1/2 %	4 1/2 %	100 1/2 —102 1/2	100 1/2 —102 1/2	..	..	..	4 7 10
3,088	Submarine Cables Trust	Cert.	6 %	6 %	6 %	6 %	127 —130	127 —130	..	..	..	4 12 4
100,000	United River Plate Telephone	5	8 %	8 %	8 %	8 %	6 3/8 — 7 1/8	6 5/8 — 7 1/8	6 3/4	..	..	5 16 4
40,000	Do. 5 % Cum. Pref., Nos. 1 to 40,000	5	5 %	5 %	5 %	5 %	5 — 5 1/2	5 — 5 1/2	..	..	..	4 10 11
80,008	W. Coast of America, 1 to 80,000 & 58,001 to 58,008	2 1/2	Nil	Nil	2 1/2 %	2 1/2 %	1 1/2 — 1 3/4	1 1/2 — 1 3/4	..	..	..	4 8 4
150,000	Do. 4 % Debs., 1 to 1,500 guar. by Braz. Sub. Tel.	100	4 %	4 %	4 %	4 %	101 —103	101 —103	..	..	..	3 17 8
207,980	Western Telegraph, Ltd., Nos. 1 to 207,980 ..	10	7 %	7 %	7 %	7 %	13 — 13 1/2	12 5/8 — 12 7/8	13	12 3/4	— 1/8	5 5 8
800,000	Do. do. 4 % Deb. Stock Red. ..	100	4 %	4 %	4 %	4 %	102 —104	102 —104	..	..	..	3 16 11
88,321	West India and Panama Telegraph	10	Nil	Nil	Nil	Nil	2/16 — 3/16	2/16 — 3/16	..	..	— 1/16	Nil
84,568	Do. do. 6 % Cum. 1st Pref.	10	6 %	5 %	8 %	6 %	8 — 8 1/2	8 — 8 1/2	8	..	..	7 1 2
4,669	Do. do. 6 % Cum. 2nd Pref.	10	Nil	Nil	Nil	£2 6	8 1/2 — 9 1/2	8 1/2 — 9 1/2	..	..	..	2 9 0
80,000£	Do. do. 5 % Debs., Nos. 1 to 1,800 ..	100	5 %	5 %	5 %	5 %	101 1/2 —103 1/2	101 1/2 —103 1/2	..	..	..	4 16 7

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.

820,000	Anglo-Argentine Trams, 10 % Nom. Cum. 2nd Pref., 260,008 to 580,007	5	8 %	8 %	8 %	9 %	8 1/4 — 9 1/8	9 3/16 — 9 5/16	9 5/16	8 13/16	+ 3/16	4 16 8
260,007	Do. 6 % Cum. Prefs., 1 to 260,007 ..	5	5 1/4 %	5 1/4 %	5 1/4 %	5 3/4 %	6 3/16 — 6 7/16	6 3/8 — 6 5/8	6 5/8	6 7/16	+ 1/16	6 4 4
266,600	Do. Permanent, 6 % Deb. Stock, 1888	100	6 %	6 %	6 %	6 %	141 —146	143 —148	..	..	+2	4 2 2
285,100	Auckland E. Trams, 5 % 1st Mort. Deb. Stock ..	100	5 %	5 %	5 %	5 %	102 —105	102 —105	..	..	..	4 15 3
880,000	Babcock & Wilcox, 1 to 580,000	1	20 %	20 %	20 %	20 %	3 7/8 — 4	3 7/8 — 4	80/7 1/2	78/6	..	5 1 6
100,000	Do. do. 6 % Cum. Pref., 1 to 100,000 ..	1	6 %	6 %	6 %	6 %	1 1/16 — 1 1/8	1 1/16 — 1 1/8	36/10 1/2	..	..	3 18 10
60,000	British Aluminium, Ord., 1 to 40,000	5	7 %	7 %	7 %	7 %	1 7/8 — 2	1 7/8 — 2	..	..	..	17 10 0
60,000	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	2 1/2 — 3 1/2 xd	2 7/8 — 3 1/2	57/6	..	..	10 0 0
40,000	Do. do. "A" 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	3 3/8 — 4 1/2	3 3/8 — 4 1/2	..	..	..	7 1 2
12,897	Do. do. 4 % Funding Certs.	5	4 %	4 %	4 %	4 %	3 7/8 — 4 1/2 xd	3 3/4 — 4 1/2	..	..	..	4 8 11
43,473	Do. do. 5 % 1st Mort. Deb. Stock Red.	Stock	5 %	5 %	5 %	5 %	105 —108	105 —108	..	..	..	4 19 7
800,000	Do. do. 5 % Loch Leven Debs. ..	100	..	..	5 1/2 %	5 1/2 %	98 1/2 —100 1/2	98 1/2 —100 1/2	..	..	..	5 9 5
400,000	British Columbia E. Rail Def. Ord. Stock ..	100	6 %	6 %	6 %	8 %	134 —138	134 — 138	137	136 3/8	..	5 15 11
400,000	Do. 5 % Pref. Ord. Stock	100	5 %	5 %	5 %	5 %	116 —120	115 —119	118 1/2	116 1/2	..	4 9 4
800,000	Do. 5 % Cum. Perp. Pref. Stock	100	5 %	5 %	5 %	5 %	107 —109	107 —109	109	..	..	4 11 9
338,000	Do. 4 1/2 % 1st Mort. Debs., 1 to 6,250	40	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	101 —103	101 —103	..	..	..	10 17 6
220,000	Do. 4 1/2 % Vancouver Power Debs., 1 to 2,200	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	103 106	103 —106	106	..	..	4 4 11
188,301	British Electric Traction	10	6 %	8 %	Nil	Nil	1/2 — 1 1/2	1 5/16 — 1 7/16	21/-	20/1 1/2	..	Nil
161,437	Do. do. 6 % Cum. Pref.	10	6 %	6 %	6 %	3 %	3 1/2 — 4	3 3/4 — 4	..	..	..	7 10 0
1,478,658	Do. do. 5 % Perp. Deb. Stock ..	Stock	5 %	5 %	5 %	5 %	90 — 95	91 — 96	94 1/2	94	+1	5 4 2
528,936	Do. do. 4 1/2 % 2nd Deb. Stock Red.	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	73 75	73 — 75	..	..	..	6 0 0
100,000	British Insulated and Helsby Cables	5	8 %	8 %	10 %	10 %	6 1/4 — 6 5/8	6 1/4 — 6 5/8	..	..	..	7 10 11
100,000	Do. do. 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	6 — 6 1/8	6 — 6 1/8	..	..	..	4 14 1
500,000	Do. do. 4 1/2 % 1st Mort. Deb. Red. ..	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	104 —107	104 —107	..	..	..	4 4 1
208,440	British Thomson-Houston 4 1/2 % 1st Mort. Debs. ..	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	91 — 96	91 — 96	..	..	..	4 13 9
400,000	British Westinghouse 6 % Pref., 1 to 200,000 and 275,001 to 475,000	5	Nil	Nil	Nil	Nil	3/8 — 1/2	3/8 — 1/2	..	..	..	Nil
1,016,358	Do. do. 4 % Mort. Deb. Stock ..	100	4 %	4 %	4 %	4 %	40 — 45	40 — 45	..	..	..	8 17 10
50,000	Browett, Lindley & Co., Ord.	1	Nil	Nil	Nil	Nil	1/8 — 1/4	1/8 — 1/4	..	..	..	Nil
50,000	Do. do. 6 % Cum. Pref.	1	Nil	Nil	Nil	Nil	14/6 to 15/6	14/6 to 15/6	..	..	..	Nil
106,781	Brush Electrical Engineering, Ord., 1 to 105,781 ..	2	Nil	2 1/2 %	Nil	Nil	..	..	..	..	..	Nil
150,000	Do. do. Non-cum. 6 % Pref.	2	6 %	6 %	Nil	Nil	..	..	..	..	..	..
125,000£	Do. do. 4 1/2 % Perp. Deb. Stock ..	Stock	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	68 — 73	68 — 73	..	..	..	6 3 3
125,000£	Do. do. 4 1/2 % Perp. 2nd Deb. Stock..	Stock	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	50 — 54	50 — 54	..	..	..	8 6 0
137,610	Calcutta Trams, 1 to 137,610	5	8 %	8 %	8 %	6 %	4 1/2 — 5	4 1/2 — 5	..	..	..	6 0 0
45, ,,4	Do. 5 % Cum. Pref., Nos. 1 to 29,230..	5	..	5 %	5 %	5 %	4 3/8 — 5 1/8	4 3/8 — 5 1/8	97/6	..	..	4 17 7
350,000	Do. 4 1/2 % 1st Deb. Stock..	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	103 —106	103 —106	..	..	..	4 4 11
35,000	Callender's Cable Construction shares	5	12 1/2 %	15 %	15 %	15 %	9 1/2 — 10 1/2	9 1/2 — 10 1/2	..	..	..	7 2 10
40,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	5 %	5 1/2 — 6 1/2	5 1/2 — 6 1/2	..	..	..	5 6 11
300,000	Do. do. 4 1/2 % 1st Mort. Deb. Stock Red.	Stock	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	107 1/2 —109 1/2	107 1/2 —109 1/2	..	..	..	4 2 2
491,222	Cape E Trams., 1 to 491,222	1	5 %	Nil	Nil	Nil	1/4 — 1/2	1/4 — 1/2	6/3	..	..	Nil
450,000	Castner-Kellner Alkali, 1 to 450,000	1	4 %	6 %	8 %	12 %	1 3/8 — 1 1/2	1 3/8 — 1 1/2	32/9	32/-	..	7 14 10
210,153	Do. do. 4 1/2 % 1st Mort. Deb. Stock	100	4 1/2 %	4 1/2 %	4 1/2 %	4 1/2 %	103 —107	103 —107	..	..	..	4 6 11
1,898,610	Central London Railway, Ord. Stock	Stock	4 %	4 %	4 %	3 %	67 — 69	65 — 67	..	..	—2	4 9 7
553,195	Do. do. 4 % Pref. Stock	Stock	4 %	4 %	4 %	4 %	86 — 88	86 — 88	..	..	..	4 10 11
553,195	Do. do. Def. do.	Stock	4 %	4 %	4 %	2 %	51 — 53	51 — 53	..	..	..	3 15 6
1,480,000	City and South London Railway	Stock	2 1/2 %	1 1/2 %	2 1/2 %	2 1/2 %	32 1/2 — 33 1/2	32 1/2 — 33 1/2	33 1/2	32	..	6 6 10

* Unless otherwise stated, all shares are fully paid. † A period of nine months. ‡ From Manchester Share List.

Continued on next page.

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.—(*Continued.*)

Present Issue.	NAME.	Stock or Share.	Dividends for the last four years.				Closing Quotations Nov. 17th.	Closing Quotations Nov. 24th.	Business done week ended Nov. 24th, 1908.		Rise + or Fall —	Present Yield per cent.
		*	1904.	1905.	1906.	1907.			Highest	Lowest.		£ s. d.
85,000	Crompton & Co., Nos. 1 to 85,000	£	2½%	2½%	5 %	5 %	1 5/16— 1½	1 5/16— 1½	..	..	..	10 0 0
100,000‡	Do. 5 % 1st Mort. Reg. Debs., 1 to 900 of £100, and 901 to 11,000 of £50 Red.	..	5 %	5 %	5 %	5 %	98 —101	98 —101	..	..	..	4 19 0
260,000	Dick, Kerr & Co., 1 to 260,000	1	10 %	10 %	10 %	10 %	1 3/16— 1 5/16	1 3/16— 1 5/16	24/3	..	..	7 12 9
305 000	Do. do. 6 % Cum. Pref., 1 to 305,000	1	6 %	6 %	6 %	6 %	1 — 1⅛	1 1/16— 1 1/16	21/3	..	..	5 1 1
276,880	Do. do. 4½ % Deb. Stock	100	4½%	4½%	4½%	4½%	101 —104	101 —104	..	..	..	4 6 7
60,000	Dublin United Trams. (1896), 1 to 60,000	10	6 %	6%	6 %	6¾%	11⅛— 12⅛	11⅛— 12⅛	..	..	..	5 4 0
60,000	Do. 6 % Pref. between 1 and 60,000	10	6 %	6 %	6 %	6 %	13 — 14	13 — 14	..	..	..	4 5 9
99,261	Edison & Swan Utd., "A" shs., £8 pd., 1 to 99,261	£	2½%	4½%	4½%	4½%	½— ⅝ xd	½— ⅝	..	..	..	16 12 6
17,139	Do. "A" shares, 01—017,139	£	2½%	4½%	4½%	4½%	1¼— 2¼ xd	1¼— 2¼	..	..	..	8 6 9
317,875	Do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	76 — 79	76 — 79	78	..	..	5 1 8
67,720	Do. 5 % 2nd Deb. Stock Prov. Certs. all pd.	100	5 %	5 %	5 %	5 %	85 — 88	86 — 89	..	..	+1	5 12 4
112,100	Electric Construction, 1 to 112,100	£	4 %	Nil	Nil	Nil	⅜— ½	⅜— ½	..	..	..	Nil
31,290	Do. do. 7 % Cum. Pref., 1 to 31,290	£	7 %	7 %	7 %	7 %	1¼— 1½	1 — 1¼	26/3	25/-	— ¼	9 6 8
25,000	General Electric Co. (1900), 5 % Cum. Pref.	10	5 %	5 %	5 %	5 %	6½— 7¼	6¾— 7¼	..	..	..	6 17 11
200,000	Do. do 4 % Mort Deb.	Stock	4 %	4 %	4 %	4 %	84 — 88	84 — 88	..	..	..	4 10 11
78,000	Gt. N. & City Rail. Pref. Ord. "A" 4 %, 1 to 78,000	10	4 %	4 %	4 %	¾%	¾— 1	¾— 1	..	..	..	5 0 0
96,000	Greenwood & Batley, 7 % Cum. Pref.	10	7 %	7 %	7 %	7 %	10½— 10¾	10½— 10¾	..	..	..	6 10 8
80,000	Do. do. 5 % Mort. Debs.	100	5 %	5 %	5 %	5 %	102 —103½	102 —103	..	..	..	4 16 10
40,000	Henley's (W. T.), Telegraph Works, Ord.	£	15 %	15%	15 %	15%	10½— 11½	10½— 11½	11¼	10⅜	..	7 8 2
40,000	Do. do. 4½ % Pref.	£	4½%	4½%	4½%	4½%	5 — 5½	5 — 5½	..	..	..	4 1 10
150,000	Do. do. 4½ % Mort. Deb. Stock	Stock	4½%	4½%	4½%	4½%	107 —109	107 — 109	..	..	..	4 2 7
50,000	India-Rubber, Gutta-percha & Telegraph Works.	10	5 %	10%	10 %	10 %	16⅜— 17⅜	16⅜— 17⅜	..	..	..	8 1 7
37,500	†Liverpool Overhead Railway, Ord.	10	1¾%	Nil	Nil	¾%	1 — 1⅛	1 — 1⅛	..	..	..	4 7 6
10,000	† Do. do. Pref., fully paid	10	5 %	5 %	5 %	5 %	4⅛— 5	4 — 4⅛	..	..	..	11 2 3
600,070	London United Trams. (1901), 1 to 50,007	10	6 %	3 %	3 %	3 %	6½— 6⅝	6½— 6⅝	..	..	..	4 8 11
399,930	Do. do. 60,008 to 100,000	10	6 %	3 %	3 %	3 %	6⅜— 6½	6⅜— 6½	..	..	..	4 8 11
125,000	Do. do. 5 % Cum. Pref., 1 to 125,000	10	5 %	5 %	5 %	5 %	4¾— 5⅛	4¾— 5⅛	..	..	..	9 1 10
1,381,000	Do. do. 4 % 1st Mort. Deb. Stock	100	4 %	4 %	4 %	4 %	70 — 75	67 — 72	73	..	—3	5 11 1
5,782,062	Metropolitan Consolidated	100	3 %	28%	1 %	¾%	36½—37½	36 — 37	37½	36½	— ½	1 7 0
2,640,914	Do. Surplus Lands	100	22½%	28%	22½%	22½%	67 — 69	67 — 69	67½	..	..	3 19 9
3,285,000	Do. District	100	Nil	Nil	Nil	Nil	12½— 13½	12½— 13	13¼	12⅝	— ¼	Nil
314,016	Metropolitan Electric Trams., Defd.	1	Nil	Nil	Nil	Nil	5/16— 7/16	5/16— 7/16	..	..	..	Nil
600,000	Do. do. 5 % Cum. Pref.	1	5 %	5 %	5 %	5 %	7/16— ½	7/16— ½	16/-	..	..	5 19 5
823,800	Do. do. 4½ % Deb. Stock Red.	100	4½%	4½%	4½%	4½%	92 — 95	92 — 95	93¼	92½	..	4 14 9
245,500	Potteries E. Tro.	£	5 %	4 %	4 %	4 %	⅛— ¼	⅛— ¼	..	..	..	8 0 0
245,500	Do. 5 % Cum. Pref.	£	5 %	5 %	5 %	5 %	⅛— ¼	⅛— ¼	..	..	..	6 17 11
245,000	Do. 4½ % Deb. Stock	100	4½%	4½%	4½%	4½%	90 — 93 xd	90 — 93	..	..	..	4 14 9
37,350	Telegraph Construction and Maintenance	£	12 %	15 %	15 %	17½%	32 — 34	32 — 34	33	31½	— ½	6 18 8
150,000‡	Do. 4 % Deb. Bds., 1 to 1.500 Red., 1909	100	4 %	4 %	4 %	4 %	101½—103½	101 —103	..	..	..	3 17 8
1,000,000	Underground Electric Railway, 5% Prior Lien	..	..	..	..	..	92½— 93½	92¼— 93¼	93½	93	..	..
2,800,000	Do. do. 4½% Bonds	..	..	..	..	..	75½— 76½	75 — 76	75⅝	..	— ½	..
4,900,000	Do. do. 6% Income Bonds	..	..	..	..	..	23 — 24	23 — 24	23	..	..	..
66,666	Willans & Robinson, 1 to 30,000 & 80,001 to 116,666	£	Nil	Nil	Nil	10 %	7/16— 7/16	7/16— 7/16	..	..	..	10 0 0
66,666	Do. 6 % C.P., 30,001 to 80,000 & 125,001 to 141,666	£	Nil	Nil	..	6 %	2⅜— 2⅝	2⅜— 2⅝	..	..	..	10 8 8
246,404	Do. 4 % 1st Mort. Deb. Stock	100	4 %	4 %	4 %	4 %	70 — 74	70 — 74	72	..	..	5 8 1

ELECTRICITY SUPPLY COMPANIES.

15,000	Bromley (Kent) E.L. & P., 1 to 15,000	5	5½%	5½%	5½%	5½%	4⅜— 4⅞	4⅜— 4⅞	..	..	..	5 11 5
70,000	Do. do. 4½ % 1st. deb. stock	100	4½%	4½%	4½%	4½%	94 — 98	94 — 98	..	..	..	4 10 0
30,275	Brompton & Kens. Elec. Lt. Sup., Ord., 1 to 20,000	5	10 %	10 %	10 %	10 %	7 — 7⅛	7⅜— 7⅞	7⅞	7½	+ ⅜	6 7 0
9,725	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	7 — 7⅛	7½— 7⅝	7⅝	..	+ ⅛	4 10 4
336,876	Central Electric Supply 4 % Guar. Deb. Stock	100	4 %	4 %	4 %	4 %	99 —102	99 — 102	..	..	..	3 18 5
80,000	Charing Cross and Strand Electricity Supply	5	8 %	5 %	5 %	5 %	3½— 4	3⅞— 4⅜	85/-	80/-	+ ⅜	5 14 3
80,000	Do. do. 4½ % Cum. Pref.	5	4½%	4½%	4½%	4½%	3⅝— 4⅛	4 — 4⅜	85/-	77/6	+ ¼	5 2 10
80,000	Do. "City Undertaking" 4½ % Cum. Prf.	5	4½%	4½%	4½%	4½%	3¾— 3⅞	3⅞— 4¼	..	..	+ ⅛	5 5 11
445,736	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	97 — 99	97 — 99	97½	..	..	4 1 8
49,486	Chelsea Electricity Supply, Ord.	5	6 %	6 %	4½%	4½%	2⅞— 3⅜	3 — 3½	68/9	..	+ ⅛	6 8 7
175,000‡	Do. do. 4½ % Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	100 —103	100 —103	..	..	..	4 7 5
70,595	City of London Elec. Lighting, Ord. 40,001—110,595	10	6 %	6 %	6 %	6 %	9½— 9⅝	9⅝— 10⅛	10	9⅞	+ ⅛	5 18 6
40,000	Do. 6 % Cum. Pref., 1 to 40,000	10	6 %	6 %	6 %	6 %	12¾— 13	12⅞— 13	..	..	..	4 12 4
400,000‡	Do. 5% Db. Stk., Scrip. (iss. at 115) all pd.	..	5 %	5 %	5 %	5 %	123 —125	123 —125	..	..	..	4 0 0
300,000	Do. 4½ % 2nd. Db. Stk., Prov. Crts., all pd.	100	4½%	4½%	4½%	4½%	101 —103	101 —103	..	..	..	4 7 5
50,000	County of Durham Electrical Power, Ord.	£	£3 7 0	4 %	4 %	2 %	2¼— 3	2¼— 3	..	..	..	3 6 8
60,000	Do. do. 5 % Pref.	£	5 %	5 %	5 %	5 %	3¾— 4	3¾— 4	..	..	..	6 5 0
200,000	Do. do. 5 % 1st Mtg. Deb.	Stock	..	..	..	..	99 —101	99 —101	..	..	..	..
40,000	County of London Electric Lighting, Ord. 1—40,000	10	4½%	5 %	5 %	5 %	7⅝— 7⅞	7⅞— 8⅛	7¾	..	+ ⅛	6 1 3
50,026	Do. do. 6 % Pref., 40,001—60,000	10	6 %	6 %	6 %	6 %	10½— 10¾	10¾— 11	10⅝	..	+ ¼	5 9 1
400,000‡	Do. do. 4½ % Deb. Stock	..	4½%	4½%	4½%	4½%	107 —110	107 —110	..	..	..	4 1 10
400,000	Do. do. 4½ % 2nd. Deb. Stock	Stock	4½%	4½%	4½%	4½%	97 —100	97 —100	..	..	..	4 10 0
80,000	Edmundson's Electric Corporation, Ord. Shares	£	7 %	4 %	Nil	Nil	3/16— 5/16	3/16— 5/16	..	..	..	Nil
80,000	Do. do. 6 % Cum. Pref.	£	6 %	6 %	3 %	Nil	3/16— 5/16	3/16— 5/16	..	..	..	Nil
430,500	Do. do. 4½ % 1st Mort. Deb. Stk.	100	4½%	4½%	4½%	4½%	62 — 65	62 — 65	..	..	..	6 18 6
$8,150,000	Electrical Dev.Co.of Ontario, 5% 1stMtg.Gold Bnds.	$500	..	..	..	..	84 — 86	84 — 86	85	84½	..	..
10,000	Folkestone, 1 to 10,000	£	5¼%	5¼%	5¼%	5¼%	4⅜— 5⅛	4⅜— 5⅛	..	..	..	5 4 9
10,000	Do. 5 % Cum. Pref., 1 to 10,000	£	..	5 %	5 %	5 %	5 — 5⅛	5 — 5⅛	..	..	..	4 10 0
90,000	Do. 4½ % 1st Deb. Stock	100	4½%	4½%	4½%	4½%	97 — 100	97 —100	..	..	..	4 10 11
15,000	Hove, 1 to 15,000	£	8½%	9 %	9 %	8½%	6⅛— 6¾	6⅛— 6¼	..	..	— ⅛	6 16 0
$1,325,000	Kaministiquia Power Co., 5 % Gold Bnds.	..	..	..	..	..	98 — 97	95 — 96	96	95	+1½	..
21,000	Kensington and Knightsbridge Electric Ord.	£	12 %	10 %	10 %	10 %	7½— 8½	7⅝— 8⅜	7 15/16	..	..	6 5 0
90,000	Do. do. do. 4 % Deben. Stk.	Stock	4 %	4 %	4 %	4 %	94 — 97	94 — 97	..	..	..	4 2 6
111,000	London Electric Supply Corporation, Limited, Ord.	£	3 %	4 %	4 %	2¾%	1 — 1⅛	1 — 1⅛	..	..	+ ⅛	5 8 1
70,000	Do. do. do 6 % Pref.	£	6 %	6 %	6 %	6 %	4⅜— 4⅞	4⅝— 5⅛	97/6	..	+ ⅜	5 17 1
374,395	Do. do. 4 % 1st Mort. Deb. Stk. Red.	Stock	4 %	4 %	4½%	4½%	89 — 92	90 — 93	91	..	+1	4 16 9
200,000	Metropolitan Electric Supply, 1 to 100,000	£	10 %	10 %	8 %	6¾%	4⅛— 4⅜	5⅛— 5⅜	5⅜	97/6	+ ⅛	6 16 10
76,121	Do. 4½ % Cum. Pref. 1—71,106	£	4½%	4½%	4½%	4½%	4⅛— 4⅜	4⅜— 4⅝	..	..	+ ⅛	4 5 9
220,000‡	Do. 4½ % 1st Mort. Deben. Stock	..	4½%	4½%	4½%	4½%	106 —109	106 —109	107½	..	..	4 2 7
248,000‡	Do. 3½ % Mort. Deben. Stock Redeem.	Stock	3½%	3½%	3½%	3½%	85 — 88	85 — 88	..	..	..	4 2 4
$6,000,000	Mexican Electric Light Co., 5% 1st Mtg. Gold Bnds	..	5 %	5 %	5 %	5 %	86 — 87	86 — 87	87	86⅝	..	5 14 11
$13,585,000	Do. Light and Power Co., 5% Cum. Pref. Stk.	$100	..	..	..	..	76½— 77½	76 — 77	77½	75⅝	— ½	..
$1,500,000	Do. do. 7% Cum. Pref. Stk.	Stock	..	..	..	..	104 — 106	107½—109½	108½	106½	+3½	..
$12,000,000	Do. do. 5% 1st Mtg. Gold Bnds.	..	..	..	..	..	88 — 90	89½— 90½	90½	89½	+ ½	..
260,000	Midland Electric Corporation, 4½ % 1st Mort. Deb.	100	4½%	4½%	4½%	4½%	95 — 98	95 — 98	96½	..	..	4 11 10
87,500	Newcastle-on-Tyne, 1 to 87,500	£	5 %	8 %	8 %	8 %	4⅞— 5⅛	4⅞— 5⅛	..	..	— ⅛	7 16 1
87,500	Do. 5 % Pref., 1 to 87,500	£	5 %	5 %	5 %	5 %	5⅛— 5⅜	5⅛— 5⅜	..	..	..	4 10 11
10,852	Notting Hill Electric Lighting	10	7 %	7½%	7½%	7½%	11⅞— 12⅜	11⅞— 12⅜	..	..	..	5 17 8
20,000	Oxford, 1 to 96 and 407 to 20,310	£	7 %	7 %	7 %	7 %	5⅞— 6⅛	5⅞— 6⅛	..	..	..	5 12 0
50,000	Do. 4 % Deb. Stock	100	4 %	4 %	4 %	4 %	95 — 98	95 — 98	..	..	..	4 1 8
119,691	River Plate Elcty. Co. Ord. Nos. 1 to 120,507	£	..	..	2½%	..	1⅝— 1 5/16	1⅝— 1 5/16	24/-	..	— 3/16	..
100,000	Do. do. 6% Non Cum. Pref. Nos. 1 to 100,000	£	6	6	6	6	1 1/16— 1 1/16	1 1/16— 1 1/16	..	..	..	..
194,684	Do. do. 5% Deb. Stk. Red.	100	5	5	5	..	99 — 102	100 —103	101½	..	+1	4 17 1
40,000	St. James' and Pall Mall Electric Light, Ord.	£	14½%	12½%	10 %	10 %	7½— 8	7⅜— 8⅛	..	..	+ ⅛	6 1 3
20,000	Do. do. 7 % Pref. 20,001 to 40,000	£	7 %	7 %	7 %	7 %	7 — 7½	7 — 7⅜	..	..	..	4 13 4
150,000‡	Do. do. 3½ % Deb. Stock Red.	100	3½%	3 %	3½%	3½%	86 — 90	87 — 91	..	..	+1	3 16 11
12,000	Smithfield Markets Electric Supply, Ord.	£	4 %	4 %	Nil	Nil	1/16— 1/16	1/16— 1/16	..	..	..	Nil
46,700	Do. do. do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	68 — 72	68 — 72	..	..	..	5 11 1
65,000	South London Electricity Supply, Ord.	£	4 %	4 %	3 %	4 %	2½— 2⅝	2½— 2⅝	..	..	..	7 12 5
120,000	South Met. Elec. Lt. & Power, Ord.	£	1	Nil	2½%	2½%	3/16— 5/16	3/16— 5/16	..	..	..	4 0 0
142,968	Do. do. 7 % Pref.	£	1	7 %	7 %	7 %	1 — 1⅛	1 — 1⅛	..	..	..	6 4 5
200,000	Do. do. 4½ % 1st Deb. Stk.	100	4½%	4½%	4½%	4½%	99 —102	99 —102	..	..	..	4 8 3
80,000	Urban Electric Supply, Ord.	£	5 %	5 %	5 %	5 %	⅞— 1	⅞— 1	25/-	..	..	20 0 0
50,000	Do. do. 5 % Cum. Pref.	£	5 %	5 %	5 %	5 %	1½— 2	1⅝— 2	..	..	— ⅛	12 10 0
275,000	Do. do. 4½ % 1st Mort. Db. Stk. Red.	100	4½%	4½%	4½%	4½%	80 — 88	80 — 88	..	..	..	5 8 5
800,000	Victoria Falls Power Co., Pref. Nos. 1 to 800,000	£	..	..	..	..	3/16— 5/16	3/16— 5/16	..	..	+ 1/16	..
110,000	Westminster Electric Supply, Ord.	£	14 %	13 %	13 %	10 %	7½— 8½	8 — 8¼	8⅜	8	+ ¼	5 17 8
81,279	Do. do. 4½ % Cum. Pref. Reduced from 5% since 31st Dec., 1905)	£	5 %	5 %	4½%	4½%	5 — 5⅛	5 — 5⅛	5⅛	5 1/16	..	4 3 9

* Unless otherwise stated, all shares are fully paid. † Quotations on Liverpool Stock Exchange. ‡ Interim Dividend.

Bank rate of Discount 2½ per cent., May 28th, 1908.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING OCTOBER, 1908.

Still another exceptional month for the exporter, in fact, a record month of a record year, the export of electrical goods having attained the extraordinarily high value of £294,753, an amount which is over £90,000 in excess of the average of the preceding nine months of this year, and compares with £224,913 in September.

The imports, on the other hand, fluctuate within limits which show a falling average. This month's total of £149,602 compares with £154,812 in September—which latter value is approximately the monthly average of the past nine months, also of the year 1907. The re-exports, at £11,135, show a considerable decrease on the September total (£20,34·). The outstanding feature of the export section is the high total, £164,405, of the electrical machinery export, this representing an advance of some £50,000 over the corresponding September return.

The cable export, at £70,330, is also on the increase. India, Japan, our Australian Colonies and the Argentine Republic were prominent purchasers, India and Japan together accounting for nearly £90,000 worth of our machinery export.

The import section does not call for particular notice, except as regards the lamp section, which, at £50,470, is a slight advance on the September return.

A point to which it is necessary to draw attention in these returns is that the export section is *exclusive* of telegraph cable and apparatus, in which this country does a very substantial, though fluctuating, business; the import section, however, has always included telegraphic business, and therefore the comparison is even more favourable to this country than it appears from our tables. We hope shortly to be able to include telegraphic cable and apparatus in our export return.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.*

Country receiving exports and importing.	Electrical goods and appliances.	Electrical cable.	Electric lighting fittings and accessories.	Electric lamps.	Electric meters and instruments.	Electric machinery.	Batteries and accumulators.	Carbons.	Telephone material, and electric bells.	Electrically-driven machinery.	Tramway apparatus and materials.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	240	342	136	274	1,145	3,140	54	...	59	12	...	5,402
Germany	110	4,635	10	...	89	1,921	9	...	12	34	...	6,820
Netherlands	362	1,540	11	16	...	532	5	...	...	...	...	2,466
Belgium	62	2,772	...	17	346	581	19	...	621	...	...	4,418
France	72	...	262	1,838	10	1,415	62	...	...	...	...	3,659
Portugal, Madeira, Azores & Portuguese India	499	982	35	79	9	378	22	...	32	...	...	2,036
Spain and Canary Isles	119	11	55	169	...	400	11	13	68	...	...	846
Italy and Austria	290	...	2	108	1,000	690	...	...	...	...	...	2,090
Greece, Roumania and Turkey...	88	6	119	198	...	405	28	...	...	...	...	844
Channel Isles, Gibraltar and Malta	43	101	16	...	53	274	14	...	...	...	...	501
U.S.A., Philippine Islands and Cuba	121	37	79	...	125	45	...	...	...	4	...	411
Canada	220	3,350	122	44	...	328	159	...	...	...	...	4,223
British West Indies and British Guiana ...	108	...	54	...	...	1,139	4	9	129	26	...	1,469
Mexico, San Salvador, Nicaragua & Colombia	47	45	116	11	2	710	...	...	...	...	...	931
Peru and Uruguay	183	90	91	174	111	92	...	...	...	...	...	741
Chile	93	551	226	59	14	4,952	10	46	36	...	...	5,987
Brazil	139	1,019	656	81	421	6,108	34	...	108	...	...	8,566
Argentine	2,734	3,823	488	1,162	578	7,234	485	84	455	35	...	17,078
Egypt	76	408	393	29	...	3,001	247	...	29	17	...	4,200
British West Africa	17	33	80	38	...	254	...	...	88	...	...	510
Cape of Good Hope	261	650	86	277	76	3,279	43	...	646	...	...	5,318
Natal	933	1,838	19	876	420	8,537	112	10	30	9	...	12,784
Zanzibar, British East Africa and Mauritius	224	20	9	...	4	54	22	...	41	...	...	374
China and Siam	584	5 271	582	1,177	127	1,820	...	...	113	34	...	9,708
Japan	362	7,936	48	68	321	42,032	182	...	313	150	...	51,412
Java	106	...	...	...	...	...	...	...	...	...	...	106
India...	2,082	8,263	2,182	1,956	172	46,433	794	131	326	718	...	63,057
Burmah	781	1,064	155	129	25	1,050	...	19	25	270	...	3,518
Ceylon	115	105	49	115	...	367	186	...	16	16	...	969
Straits Settlements and Fed. Malay States ...	322	766	44	342	111	808	34	45	138	64	...	2,674
Hong Kong	88	4,443	278	94	...	678	9	...	15	...	...	5,605
West Australia	169	420	4	86	...	503	58	...	61	15	...	1,316
South Australia	1,713	2,685	42	14	1,002	5,524	2,460	...	47	...	...	13,487
Victoria	1,414	6,391	120	408	...	1,572	184	...	234	...	...	10,323
New South Wales	3,194	9,851	392	561	189	10,911	5,632	...	182	76	...	30,988
Queensland	208	...	11	...	...	4,136	51	...	...	...	...	4,406
Tasmania	14	...	...	...	...	...	...	...	...	...	...	14
New Zealand and Fiji Islands.	708	882	457	203	...	3,102	95	...	31	18	...	5,496
Total, £	18,901	70,330	7,429	10,603	6,350	164,405	11,025	357	3,855	1,498	...	294,753

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Norway, Sweden and Denmark ...	20	105	...	247	...	547	935	192	1,804	120	...	3,970
Germany	1,482	7,345	451	37,447	...	9,012	2,187	3,699	1,899	381	...	63,903
Holland	2	5,562	386	8,306	2,524	2,675	173	4,647	558	...	...	24,833
Belgium	858	6,583	1,057	3,145	103	7,391	296	1,183	7,808	12	...	28,436
France	83	1,694	358	1,189	1,291	53	2,675	3,550	173	45	...	11,111
United States	2,723	67*	1,079	136	...	6,766	397	139	189	5,424	336	17,122
Total, £	5,168	21,222	3,331	50,470	3,918	26,444	6,663	13,410	12,431	5,982	336	149,375

* Deduct, to correct previous returns. Additional Imports: Canada, electrical goods, £195; New South Wales, electrical machinery, £32.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

	£	£	£	£	£	£	£	£	£	£	£	£
Various countries, mainly as above	1,941	1,062	500	1,669	...	2,740	841	718	1,664	...	...	...

Total Exports: £294,753. Total Re-Exports: £11,135. Total Imports: £149,602.

Note.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns.

* This section does not include telegraph cables and apparatus.

REVIEWS.

Modern Power Generators. Edited by J. W. French, B.Sc. London: Gresham Publishing Co. 1908. In two vols. Price £2 2s. net.

This work is a remarkable production in several respects. It covers an exceedingly wide field, and is intended for the use of not only technical readers, but also laymen who desire to gain an insight into the working of the various types of prime mover which are now in universal employment. Beginning with steam generators, the author discusses the various types of externally and internally-fired boilers, tubular boilers and the rapid-circulation type, briefly outlining the leading features of sound construction and good management, and touching upon the various accessory apparatus, such as feed pumps and boiler fittings. This section occupies 44 pages.

Next the steam engine is dealt with, from the simple slide-valve type to the steam turbine, in a space of 78 pages, followed by the steam locomotive in half that space. A short section on continuous railway brakes concludes the first volume; this subject is wholly outside the scheme of the work, and it is difficult to understand the reason for its intrusion—the mere fact that it is an interesting subject cannot be regarded as a valid excuse.

In the second volume electrical generators and motors occupy the opening section, and here we feel that the author has again digressed considerably from the path indicated by the title. Strictly speaking, neither electric generators nor electric motors fall within his purview; we could have strained a point to include the former, but the latter are somewhat too far from the prime mover.

The whole subject is dealt with in 48 pages, of which the first 20 are occupied by an elementary treatment of electrical theory, beginning with frictional electricity and primary cells—even the thermopile is included! A magneto-electric machine of a primitive type is also described, and, in fact, only some 28 pp. are devoted to modern forms of machines. Having included a subject of such great inherent complexity, we think the author might well have omitted the historical element, and devoted the whole of his available space to the subject of electro-magnetics, with which alone he is here concerned. The following section is given up to gas and oil engines; apart from the far-too-frequent references to ancient history, and illustrations of "early Otto" engines, &c., in some cases without any useful description in the text, the section contains a considerable proportion of informative matter.

The last section, of 66 pages, is devoted to the motor-car. Here the author has little ancient history to draw upon, and consequently the section consists mainly of up-to-date matter.

Regarding the book as a whole, we may say that, to the non-technical reader, who is under no special obligation to make himself *au fait* with the subjects dealt with, this work will prove highly interesting and relatively instructive; it will give him a general insight into the construction and working of power-generating machinery and apparatus. A special feature of the work is the series of composite sectional models incorporated in it, by means of which the reader is enabled to dissect a boiler, engine, turbine, locomotive, air-brake, electric motor, gas and oil engines, and an automobile. These are almost unique; we recollect only one previous instance in which this plan has been adopted in a technical work. The models are excellent, and full of information. We shrewdly suspect that the idea of employing them was the *fons et origo* of the whole work; the latter, we take it, has been built up around the models, to clothe them as it were.

Many of the illustrations—the majority, in fact—are line or half-tone drawings of great merit, printed of necessity on very good paper. We regret to add that not a few of the illustrations are mere catalogue wood-cuts, of very inferior quality at that. As will have been gathered from our foregoing remarks, the treatment of the subject in the text is also very unequal; this is no doubt difficult to avoid in a work of the nature of a symposium, such as we take this to be, though the names of the contributors are not mentioned.

To the amateur and non-technical reader the book may confidently be recommended; for the engineer, who has to know his subject, the work is altogether too superficial to be of any real value. When it is borne in mind that the whole of the immense field outlined above is covered in 400 pages, of which a large proportion is occupied by illustrations (500 in number) it will be obvious that no other result could possibly be expected.

The Evolution of Forces. By Dr. Gustave Le Bon. London: Kegan Paul, Trench, Trübner & Co. Price 5s.

This book of over 30 chapters and about 377 pages is a development of the novel ideas put forward by the author in his "L'Evolution de la Matière." The preface is written by F. Legge, of the Royal Institution of Great Britain, who states (on p. 7) that "There seems, therefore, good reason to suppose that Dr. Le Bon's later theories as well as his earlier ones are now widely accepted by men of science, and that before long this acceptance will be extended to all points of his doctrine."

The volume is divided into five books, and deals with the Anarchy of Science, Time, Space, Matter and Force, Dogma of the Indestructibility of Energy, the New Conception of Forces, the Dematerialisation of Matter, the Transformation of Matter, Problems of Heat and Light, Problems of Phosphorescence, Black Light, Forces of Unknown Origin and Hidden Forces, and Forces Manifested by Living Beings, &c.

It is needless to say that owing to the vast ground covered by the author, it is almost impossible to deal adequately with such a work in a brief review.

The writer refers to Poincaré's criticism of the fundamentals, which reduces all our so-called knowledge to chaos. This, however, does not alarm anyone, and we have all heard of this before. Is it not better, instead of troubling ourselves about the absolute knowledge, &c., to take things as they are, and following the example of all those who have made science progress, endeavour to solve such problems as we meet with?

The writer sets up the following views:—(1) Matter and energy are destructible; (2) there is no distinction between ponderable and imponderable bodies; (3) matter is a reservoir of energy; (4) force and matter are forms of the same thing; (5) matter is transformed into energy; (6) evolution is applicable to ordinary dead matter as to living matter.

Now, it will be noticed that most of these views are highly controversial at the present time, and one can hardly be expected to follow the merely dogmatic assertion that matter is energy, and in process of evolution or degradation evolves electricity as a by-product, and that in the course of time all matter will have vanished away.

So far as the writer is aware, there is no proof that there is any actual evolution going on amongst the elements. Certainly a few experiments on isolated salts seem to point to an evolution or degradation, but it is rather early in the day to apply it all round. The author continues in the following strain (page 80):—"Matter is velocity, and as a substance animated by velocity is also energy, matter may be considered a particular form of energy." This is merely a grossly dogmatic assertion.

All energy, according to the author, being due to intra-atomic forces, the sun's heat is easily accounted for. "Thus, then, the sun, the generator of most of the terrestrial energies, only expends the forces slowly accumulated in matter at the epoch when within the primordial clouds of the ether, the atoms stored up the energies they were one day to restore."

The author refers on page 93 to observations of the spectrum of a variable star which, at first very bright, afterwards contained in its spectrum only the usual lines found in a nebula, &c. He says "the astronomers were then enabled to be present at the rapid destruction of a world," and he assumes the cause to be atomic dissociation. He concludes this by writing (page 99) "energy is unceasingly consumed, and tends to vanish like the matter, which represents one of its forms."

Because electrons, &c., are present in flames, the author

concludes that "matter is incessantly transformed into light," in this case.

The rest of the work deals with phosphorescence, &c., even the attraction by the hand of a suspended straw under a bell glass being referred to on page 351, and it is even hinted on the same page that possibly large birds soar because they have some intra-atomic means of disposing of gravitation!

On page 365 "instability" is stated to be the "law" of life. This reminds one of Marcus Aurelius—Death is, of course, "stability." Now it is well known that living and dead matter does not differ greatly (*vide* "Electro-Physiology," by J. C. Bose). Again, he states, "the vital forces are maintained by the chemical forces derived from the food, and it is the last which uphold the first" (page 367).

It seems to the writer that this is not a highly illuminating statement.

On page 372 he pays a high tribute to Darwin, who, he states, "made us see the laws which know no caprice, such as adaptation, selection, and the survival of the fittest, can explain the transformation of living beings." One can only say that the Evolutionists' "laws" are but theories, incapable of absolute proof, and that regarding the highly organised creatures, it is difficult to imagine their fortuitous development from the simple protoplasmic cell.

The book is, however, a non-mathematical work of great interest, and contains a marvellous amount of matter.

On page 189 "Leslie's cube" is referred to as "Lister's cube," otherwise there appear to be no mistakes in this beautifully printed book.

SOME NOTES ON MEXICO.

By EXPERIENCE.

MANY people in this country have such an extremely hazy idea as to where Mexico actually is, that the writer of this article will, no doubt, be forgiven for commencing with the statement that it is on the Continent of North America, is bounded on the north by the United States, and on the south by Guatemala. It is a republic, and has a population of about 15 millions. The official language of the country is Spanish, which to all intents and purposes is the same as that spoken in Spain. Certain persons not acquainted with the country, state that a patois is spoken. This is quite incorrect, and is equivalent to saying that correct English is spoken in East London, and a patois in Lancashire.

The usually accepted idea of a Latin-American republic is that of a place where a revolution takes place once per week, and where the male population spend their time swaggering around with a gun on. There is nothing of this kind going on in Mexico, the tough element having been eradicated almost entirely under the administration of General Porfirio Diaz, who is still in power. The class which corresponds to what is known as the middle class in this country, is gradually being built up, but, roughly speaking, there are now two classes, upper and lower. The wealth of the former consists of land, upon which the lower classes work.

The writer will now endeavour to give a few particulars of the various industries which are carried on in Mexico:—(1) Agriculture; (2) Mining; (3) Railways; (4) Electricity; (5) Miscellaneous.

Agriculture.—As readers of the ELECTRICAL REVIEW are not in any way interested in agriculture, the writer will be content with only a few lines under this heading. The principal crops of the country are as follows:—Maize, wheat, coffee, sugar, tobacco, tropical fruits, rubber, henequen, &c. All kinds of European fruits grow well in the higher lands if they receive proper attention. Cattle are extensively and successfully raised, but sheep are of poor quality as a rule. Agriculture is almost entirely in the hands of wealthy Mexicans.

Railways.—Several of the railways have recently passed under the control of the Government. The railways of Mexico are thoroughly up-to-date, and a first-class service to all parts of the Republic is in operation. Locomotives and rolling stock in every case are of American manufacture. At present, engine-drivers, conductors, and the majority of men holding executive positions, are Americans. Mechanics, brakesmen, and workers generally are Mexicans, who belong to the Mexican Railway Employés' Trade Union. Some new roads are under construction, which will open up some very rich mining and agricultural districts.

Mining.—Mexico has, ever since the days of the Spanish conquerers, been a great mining country, and enormous progress is being made in this direction at the present day. Gold, silver, copper, zinc, lead, coal, iron, and petroleum are found in various parts of the country. An enormous amount of foreign capital is invested in mining, and many English and American mining men find an outlet for their knowledge. Owing to the high price of fuel of all kinds, mining engineers adopt electricity wherever it can be obtained. As more mines are opened up the outlet for electrical material will increase. At the present time there are mines which are made to pay with cheap electricity, but which would be quite unworkable otherwise. The following are some of the Mexican mining camps:—Guanajuato, El Oro, Cananea, Parral, Pachuca, Zacatecas, Taviche, Sultepec, &c.

Electricity.—As this is the industry with which readers of the ELECTRICAL REVIEW are mostly concerned, the writer will endeavour to give some information on the various electrical undertakings in operation in Mexico at the present time. It is not intended to touch upon any technical points whatever in this article, the purpose of the writer simply being to supply details to the electrical trade in England of a market which has been practically untouched by English manufacturers. Owing to the price of coal, gas is an unknown quantity in Mexico. A scheme is under way to make gas from crude oil, but very little has been done as far as the writer knows. The incentive which is given by the Government to persons erecting factories on Mexican soil, together with the protective tariff now in force on goods made abroad, will tend to increase the demand for all classes of machinery, electrical and otherwise. German and American interests are well looked after. A.E.G., Siemens-Schuckert, Westinghouse, and the General Electric Co., New York, all have branches in Mexico which hold extensive stock. With the exception of a cable firm, English interests appear to be without representation. In the majority of towns current for lighting is supplied at 120 volts, 50 cycles. Wiring is done in the smaller installations with flex fixed on insulators. Meters are used in the large cities, but in the smaller ones current is supplied at so much per lamp per month. There will, in the opinion of the writer, be a larger market for meters when, with the growth of the power load, it becomes out of the question to shut down the plant in the day-time, as is now the custom in a number of the smaller installations. Glow lamps are made in large quantities in the City of Mexico, but everything else is imported from the United States or Germany.

Before passing on to the heading of miscellaneous, a few particulars of the larger power undertakings will be of interest to readers.

The Mexican Light and Power Co.—The technical details of the main power house of this company have been already described in this journal. It will, therefore, be sufficient to give a few particulars of the class of load which they are carrying. The company are supplying power over a large area in the State of Mexico, and have, roughly, 20,000 consumers. They are supplying the public and private lighting in the City of Mexico, driving the street cars, and furnishing power for driving machinery of every class, such as corn and flour mills, cotton factories, ironworks, pumps. In addition to this, they are supplying power to the El Oro mining camp, where about 12,000 H.P. in motors are connected. The various mines use together a load of about 5,000 KW. 24 hours per day. The distance between El Oro and the main power house is about 185 miles; the line pressure in use is 60,000 volts. The total plant capacity of this company is nearly 70,000 KW. in water and steam power.

Hidalgo Power Co.—This company is better known under its Spanish title which is Cia. I. y H.-E. de Hidalgo. It is supplying power to the city of Pachuca and to various mines in the neighbourhood. It has two power houses some distance out of Pachuca, and the line pressure is, the writer believes, 20,000 volts. The equipment is of American manufacture.

Guanajuato Power Co.—This company is supplying power to the city of Guanajuato and various mining camps in the

district. It is a water power plant, and has a transmission line about 100 miles in length ; line pressure 50,000 volts.

At Vera Cruz and Puebla, there are plants owned by the Pearson interests. Diesel oil engines are in use at the former place, and current is used to drive street cars and supply light in the port of Vera Cruz. The Puebla plant is a water power proposition.

At Guadalajara, a Spanish syndicate supplies electricity, and various concessions have been granted to develop power in the district. There has already been a notice in the REVIEW on this matter.

Every town of any importance in Mexico, either has or is going to have, electric light in the future. The writer does not propose to give a list of towns, &c., where it is installed, as the majority of the names would be quite unknown to readers. The outlook for electricity in Mexico is very bright indeed, and the situation can be expressed as follows :— They've got to have it—and it is merely a question of raising capital to carry out the various schemes.

Miscellaneous.—Under the above heading the writer will endeavour to give a general idea of climatic conditions, cost of living, &c., in Mexico. To begin with, Mexico consists of a series of table lands, and whether a given place is good or otherwise to live in depends entirely on its height above sea level.

The writer lived two years in the City of Mexico and one year at the El Oro mining camp. The former place is something over 7,000 ft., and the latter is 10,000 ft. above sea level. The City of Mexico is an extremely nice place to live in. It is well lighted, paved and drained, there is a good street car service, and one sees practically no rowdiness in the streets. Laws are strict, and a foreigner is as safe as if he were in his home town. Things are naturally rather more crude in a mining camp, but a man who goes to live in a mining camp does not, as a rule, expect much. Conditions in most of the large cities are good, and if a man goes up country to one of the mines he usually finds that there is a house on the mining company's property for the staff. Many of the mining companies go to the length of building a house specially, if a man wants to bring his wife with him. Such things as yellow fever, small-pox, &c., have been stamped out almost entirely under the present administration. Since Vera Cruz, where fever used to rage periodically some years ago, has been drained, there have been hardly any cases. There is quite a large amount of typhus in the City of Mexico at times, but it is limited mostly to the lower classes, and is the outcome of lack of cleanliness. In the winter pneumonia causes a great many deaths ; this is due to the fact that people do not take care to wrap up when going out at night. There is a great difference between the day and night temperature during these months, and there is snow at rare intervals. Except in one or two parts of the city the water supply is not particularly good, and water should be drunk only after boiling and filtering. A new water works is under construction, however, and in the near future Mexico City will have one of the finest water supplies in the world. An Englishman who gets the chance of a position in Mexico from this side, should not consider any salary under £200 per annum, and even with this it is hard work to make both ends meet at first. On going abroad for the first time a man feels very much out of it. If he has social introductions, he has various clubs, &c., to join and certain social obligations to fulfil, all of which are liable to make serious inroads into his first year's salary. Being unacquainted with the language is a serious drawback, but Spanish is not a difficult language to learn. Room and board can be obtained with a Mexican or American family at £6 per month upwards ; clothes, hats, boots, &c., cost double what they do in England. There are several clubs to join, but, speaking generally, there is not a large selection of amusements. If a foreigner ever expects to hold any good position, he simply must learn Spanish, otherwise he is dependent upon his subordinates. It is quite useless for an Englishman to land in Mexico to look for a job unless he has either powerful friends or else enough money to keep him going for a couple of months. Later on maybe an Englishman will stand a better chance of dropping into something, but at present the majority of electrical men are Americans, who will put their own countrymen in wherever possible. Whether this is due to prejudice, freemasonry, or because the Americans know more about the class of goods being used, the writer will leave open for discussion. The subordinate positions are held at present by Mexicans, many of whom are qualifying for better things with the help of correspondence courses, &c. Should any reader of the ELECTRICAL REVIEW contemplate going to Mexico, the writer will be glad to be of any assistance.

UNFAIR METHODS OF TRADING.

[COMMUNICATED.]

YOU have frequently maintained in your columns that the unprofitable condition of the electrical industry in this country has been, and is, largely due to internal causes. Many attempts have been made to show that an alleged effete fiscal system is at the bottom of all the troubles, such as they are ; but the most that can be conceded in this respect is that the case is "not proven." You have, however, not been spared in criticism by those who, whilst grumbling about their "sorry scheme of things entire," and for ever exclaiming "How blest the Paradise to come !" have, for want of a little introspection, failed to see where their own house could be put in order.

Beaconsfield is alleged to have said on a certain occasion that every country has the Jews that it deserves. In the same way every trade or profession may suffer from actions which, owing to the laxity of the majority, may be carried on by a minority to the detriment of the whole body. In those cases only where the majority form a strong party, the members of which formulate rules and a code of etiquette, is it possible to maintain some sort of discipline and to enforce upright dealing.

It is only necessary in this connection to refer to the many professional associations, and to those formed by the builders and ironmongers amongst the trades. Owing to the want of cohesion and the mutual mistrust that exists in the electrical trade, it has, unfortunately, been impossible, up to the present, to do anything on these lines. As a result, home competition by fair and unfair means has killed all reasonable profits in large manufactures and bids fair to do so in the accessories business. Naturally, the keener things are cut, the greater is the incentive to adopt questionable means of obtaining business, and the more does mutual mistrust increase. Where firms once led they now only follow.

I am sorry to have to state that the practice of "cribbing" other people's ideas has of late years grown enormously, and on the part of firms who ought to know better. It has been taken for granted that the small man whose patent or design is infringed will rather come to terms than fight, and in ninety-nine cases out of a hundred this is so.

But there is a more insidious policy even than this. An article is put on the market embodying a principle, perhaps, that cannot be patented. The manufacturer has spent a good deal of money in making patterns or tools, in catalogues or advertising. Under the circumstances, it is quite *legal* for anyone else to produce a similar article, and the maker could not complain. But it is obviously *immoral* if some other manufacturer, having, perhaps, extensive connections and large resources, immediately puts on the market a cheap and inferior imitation of the real thing, and uses his power to squeeze the first maker out. No one could object if he employed his resources in making something better, whereby the trade and the whole community would benefit.

Again, an article is brought out for a certain utilitarian purpose ; it cannot be patented, but it has certain lines or form, the design of which can be registered under the Copyright Act. Immediately, another manufacturer puts on the market a similar article, to all appearances of the same design, but actually altered slightly, so as to evade the Act. Again, the first maker goes under, if he has not got resources of his own. In any case, his sale of the article in question is sure to be reduced largely.

I am not romancing on this question ; everybody in the trade knows that the practice has been going on for a long time, but recently three or four concrete cases of a partic-

ularly flagrant nature have been brought to my notice in connection with fixtures for electric light. In at least one of the cases the original makers will most likely be squeezed out, whilst in the rest the original makers will have their turnover reduced and the standard of the original articles will be lowered.

Small wonder, then, if confidence is wanting where such practices are rife. The writer still has hopes, though, that the universal reprobation which such behaviour must call forth, will ultimately induce manufacturers to see that it can only be checked by some mutual understanding and regulation of the trade. It is idle to stand aside, because so-and-so would be at the same table, and he is one of the culprits. I believe that is a sentiment that has had much force in keeping the trade apart. It will only be possible to outvote the offenders, and to use disciplinary measures against them, if the respectable and upright members of the trade (who I believe conscientiously to constitute a large majority) will agree to sink all feelings, and work for the greatest good of the greatest number.

AN APPLICATION OF INTERPOLES.

By J. H. THOMAS.

A POINT in connection with the recent development and use of commutating poles on direct-current generators and motors is well brought out by the following example, and should prove interesting, especially to people who possess machines suffering from commutation troubles.

A direct-current compound-wound generator for an output of about 600 KW., at 500 volts and running at 150 R.P.M., built about seven years ago, did not give satisfaction, owing to sparking at the brushes, these needing an inordinate amount of attention, and having to be continually adjusted as the load changed. Various samples of holders and brushes were used, but without improving the result.

The fitting of interpoles was then suggested as a means of getting over the difficulty, and about a year ago the generator was returned to the factory and the poles were fitted.

In view of the fact that a certain amount of engine power was available, and additional motors were being installed, it had also been suggested that, as the temperature rise of the generator was very low, it might be possible to increase the output without detrimental effects, and that this would compensate for the cost of alteration.

The generator was returned, and the alterations carried through. The machine was then run on the test bed, and an output of 720 KW. was reached without sparking at the brushes or the temperature rise exceeding permissible limits. The commutation was in every respect perfect, and brush adjustment was not necessary. The temperature rise on large slow-speed machines is generally low, showing clearly that a few years ago sparking and not temperature rise was the limiting feature in the design. In any case this particular machine was so designed.

A large number of machines now in use could be treated as above, and the cost is small compared with the benefits obtained. With ordinary facilities, such alterations could be carried out on the site, thus saving a lot of expense, as, in this particular instance, the costs of freight and packing were a large percentage of the total cost.

On some of the older designs of D.C. generators, the armature and commutator remain fairly cool while the temperature of the field coils is high. As the fitting of interpoles retards the ventilation, it might, in some cases, be necessary to fit a few ventilating blades on the armature, so that the field-coil temperature rise could be kept down. This would not often be necessary.

In a compound machine such as the one in question, a little more of the main current can be diverted through the compounding coils to make up for the magnetic leakage due to the introduction of the interpoles. This was done in this instance.

It is not always possible to make such an alteration, owing to the design of the machine, but in general it will be found possible. The output cannot always be increased, as this depends on the prime mover, but it is nearly always possible to better the commutation.

PARLIAMENTARY.

London and District Electricity Supply Bill.

MR. FITZGERALD, continuing his address on Wednesday, November 18th, said that the companies in their opposition had stated that already £21,000,000 was sunk in electrical enterprises, and that by this Bill another £6,000,000 would be added to that sum, and instead of cheapening the supply to the consumer, it would make it dearer. The opponents had, however, lost sight of the fact that a large part of that money would be spent in cheapening the generation, and therefore the cost to the consumer would be less than hitherto. Dealing with the contention that the Bill would mean unfair competition, counsel pointed out that already there was competition between the authorised undertakers. It was said that there had never been competition in the case of power companies, but they were only asking powers to compete with a very small portion of authorised undertakers' business, and even that was hedged round by the protection of the Kitson Clause, which was undoubtedly a valuable protection. It was as unreasonable to give authorised undertakers a statutory right of preventing his company entering an area, as it would be injurious to the power consumer, whose premises were situated within their district. As to the contention that the promoters might charge a very low price in order to get into an area, the equality clauses of the General Acts would protect the authorised distributor. His justification for that Bill was that the present undertakers could not generate as cheaply as they would, and in that event the authorised distributor's position was guarded by the provisions of the Kitson Clause. The maximum prices in their Bill were lower than those in the Administrative Co.'s Bill of 1905.

The CHAIRMAN said that, taking it generally, the area of the Bill would be dealt with as a whole. In the case of Croydon and other exceptional districts, the Committee would consider them on clauses. Dealing with the area covered by the Bill, Mr. Fitzgerald said they had taken that which was proposed in the L.C.C. Bill. As to Middlesex's opposition there were many local authorities there who might be prepared to come and take a supply from the promoters. The chairman said that the Committee were of opinion, subject to what might be said in argument, that the Metropolitain Co. occupied a rather exceptional position, which would be dealt with when the clause stage was reached.

Passing to the proposals of the companies to link up their stations, MR. FITZGERALD said that it was suggested that the six stations possessed by the companies should be linked up. Those stations, however, did not all generate in the same way, and therefore they could not send the different supplies through one main, and they would thus need a very large expenditure on new transmission mains; further than that there would have to be a transforming or conversion process which would greatly add to the cost of generation.

The CHAIRMAN said that the question of linking up the present stations would not weigh on the minds of the Committee in coming to a decision on the Bill now before them.

MR. FITZGERALD, continuing, said that as regarded the financial backing of the scheme, they had a body of gentlemen who had come forward and said that they were prepared to find £600,000 between them. If they did not believe the public would subscribe to the scheme the promoters would not have gone on with the Bill when it left the House of Lords.

The CHAIRMAN said that if the Committee passed the Bill, they would see that the clauses were altered in such a form that the promoters would be able to raise the necessary money.

The Committee having consulted in private, the CHAIRMAN said: After a lengthy inquiry in which the Committee have fully considered the evidence which has been given from day to day, and the arguments and speeches of counsel, we have come to a decision—a unanimous decision, that we shall be obliged to report to the House that the preamble has not been proved.

London Electric Companies' Bill.

ON the 19th inst., the Committee commenced the consideration of the Bill promoted by the London Companies. Mr. Balfour Browne, K.C., with Mr. Hutchinson and Mr. Tyddlesley Jones appeared for the promoters, and a number of counsel representing various local authorities are reserved to oppose the Bill on clauses.

MR. BALFOUR BROWNE, in opening the case for the promoters, said that the Bill was to confer further powers upon certain London electric companies. They wanted powers to link up each station, so as to afford mutual assistance to each other. Clause 3 "read": It shall be lawful for the London Electric Supply Companies, or any two or more of them, to enter into and carry into effect any agreement or agreements for mutual assistance or for association with each other in regard to the following purposes:—(1) The giving and taking of a supply of electrical energy and the distribution and supply of electrical energy so taken; (2) the manage-

ment and working of the generating stations, or any part or parts of the several undertakings of the contracting parties; (3) the appropriation and division of receipts arising under, and the provision of capital required for carrying into effect any such agreements; (4) any matters or things incidental to or connected with any of the powers aforesaid; (5) except in so far as is provided by this Section the companies entering into such agreement shall remain and be subject to all the same obligations and liabilities to all persons not being parties to such agreement as they would have been subject to if such agreement had not been entered into.

Clause 4 gave the promoters powers to lay connecting mains in order to carry out the scheme, and under Clause 5 the companies took power to give energy for haulage, traction and the lighting of such vehicles so hauled, even though the haulage of trains went on outside the companies' area. The Bill, as presented to the House of Lords, was really a similar scheme to a bulk supply, but it now came before the Committee simply as a linking up proposal. He did not think the L.C.C. were opposing the Bill so far as the coupling up was concerned. The House had sent down to the Committee an instruction which read, "That it be an instruction to the Committee that they have powers to insert such provisions in the Bill as will ensure that the powers to be conferred upon the companies shall be conferred also upon local authorities who are authorised distributors." He read that as meaning that the Committee could allow local authorities to link up with the companies.

Mr. Freeman, who appears for the L.C.C., said that they read it that the clause meant that the local authorities should have powers to link up amongst themselves, but not intercommunicating with the companies.

Mr. Vesey Knox, representing various local authorities, and Mr. H. Lloyd, who appears for a number of Corporations, said they agreed with the view taken by Mr. Balfour Browne.

The Chairman: The Committee would interpret the Instruction in the widest sense possible, and I think, if we passed the preamble of this Bill, we should go further. I think it must be the intention of Parliament that, if powers are given to these companies to link up, there should be a general provision enabling local authorities also to link up, and that to the linking up of local authorities, there should be added to it those companies who are not included in the present Bill, if they should desire to take advantage of it in the same way as the local authorities.

Continuing, Mr. Balfour Browne said there was also an instruction that the L.C.C. should be the purchasing authority, and as far as he was concerned, he had no objection to that, provided the purchase was to be made on equitable terms. Of course if the L.C.C. was the purchasing authority, it would prevent severance.

Mr. Freeman said that they would have to consider what "equitable terms" meant.

Mr. Balfour Browne said that if the L.C.C. was inserted as the purchasing authority, he was prepared to give evidence on that point.

Mr. Blennerhassett, for the City of Westminster, said that they had no objection to the preamble of the Bill, but they did object to the L.C.C. being the purchasing authority.

Replying to Mr. Pollock, for Middlesex County Council, Counsel said that the L.C.C. was only a substitute for the present purchasing authority. The Middlesex County Council had no powers to purchase the Metropolitan Electric Co. in regard to their power supply, and therefore the L.C.C. could not take that over.

Mr. Vesey Knox said that in Southwark they already had two companies competing with them, and if the London Electric Supply Corporation should link up with the other companies, it would place them in a favourable position to compete with the local Council.

Mr. Balfour Browne said that if the London Electric Supply Corporation joined in the scheme, Southwark Borough Council under the Equality Clauses would be placed in a more advantageous position than they were at present.

Mr. Rigg, representing the City Corporation, said he did not object to these companies having certain facilities amongst themselves, but he did object to their having further powers conferred upon them under the Bill.

Replying to some observations by Counsel, the Chairman said that the Committee took the instruction that the L.C.C. should be the purchasing authority to mean simply within the county of London.

Mr. Vesey Knox and Mr. Meyer said they did not oppose the Bill in preamble, but they did not think it went far enough.

Mr. Fitzgerald pointed out that if the L.C.C. was to be the purchasing authority simply within the area of London, that would raise grave difficulties, as in some instances there were generating stations outside the county of London.

Mr. J. B. Braithwaite, Chairman of the City and County of London Companies, said that the linking up of the stations would afford greater security. At many of the stations there was surplus land, buildings and plant, and under their scheme that could be utilised.

Mr. C. P. Sparks, joint engineer to the promoters, also gave evidence.

Mr. Rigg asked that a clause should be inserted preventing the companies from taking mains through the city.

Mr. Vesey Knox called Mr. Harrison, borough engineer to Southwark. He said that at present there were two companies competing with the Council in Southwark. If they should link up with each other, it would mean that the undertaking of Southwark would be depreciated.

Mr. Vesey Knox, in his address to the Committee, said that the effect of Clause 3 of the Bill would be to squeeze the Southwark Council out, because when the companies had got rid of the competition in the northern part of the borough, they would use the additional profits they had got there in order to force them out. He did not object to the linking-up scheme, but he did ask that they should not be allowed to couple up two distributing systems.

The Committee passed the preamble of the Bill.

On the discussion on clauses, after Mr. Freeman had addressed the Committee, it was decided to insert the L.C.C. as the purchasing authority in 1931.

Mr. Rigg explained that the City had the option of purchasing one or either of the undertakings supplying in the City, and

The Chairman said that with regard to the City, assuming that that authority did not purchase the undertaking by 1931, the London County Council would become the authority.

Mr. Browne asked that the City should not take over one undertaking without the other.

The Committee decided not to interfere with the power of local authorities between now and 1931.

Mr. Browne said he was quite willing to allow the same provision to the local authorities as to the companies in respect of a supply for haulage and lighting.

Friday, November 20th.

Mr. Balfour Browne, at the opening of the proceedings, said that the action of the Committee the previous day had placed the companies in an awkward position. He explained that under the existing law, local authorities when they acquired an undertaking had to pay for severance; but by the decision that the L.C.C. was to be the purchasing authority of all the undertakings nothing would have to be paid for severance. The Committee had, however, inserted a proviso that the existing powers of local authorities were not to be interfered with, and accordingly the City Corporation and the Camberwell Borough Council could purchase so much of the undertakings as laid in their areas. That would prevent the L.C.C. in 1931 from being able to take over all the companies. He ventured to submit that it was on the basis that the L.C.C. were to be the purchasing authority of all the undertakings that the promoters had agreed to the L.C.C. as the authority to acquire the companies. On July 23rd the companies had an interview with the Board of Trade on the matter, and on July 24th they passed the following resolution: "That the companies promoting the London Electric Supply Bill agree not to oppose the insertion in that Bill of the provision stating the L.C.C., or any other central authority, to be the purchasing authority on equitable terms, it being understood that the purchase is to take place at the same time of all the undertakings of the companies, and that if the terms are not such as the companies consider equitable, they are to be at liberty to withdraw their Bill." That resolution was shown to the President of the Board of Trade, and he expressed himself satisfied with it. Counsel asked the Committee to alter their decision of the previous day, and to say that all the undertakings were to be taken over at the same date.

Mr. Freeman, for the L.C.C., pointed out that there were other companies not purchasable at 1931—they were the London Electric, which could be acquired in 1927; the Chelsea, in 1928; Charing Cross, in 1942; and the City of London, in 1932. He did not object to the local authorities that had the power exercising their right of purchase before 1931.

Mr. Rigg, for the City Corporation, remarked that the action of the promoters was an attempt to get an advantage which was never contemplated by the Bill.

After further arguments from counsel, the Chairman said the Committee had unanimously decided not to alter their decision of the previous day.

Mr. Browne thereupon asked for an adjournment, in order to consult his clients to see whether they would proceed with the Bill.

Mr. H. Lloyd, representing various local authorities, said that if the promoters used their discretion and withdrew the Bill, he might ask to be allowed to take it up.—The Committee adjourned.

On resuming, Mr. Balfour Browne said that he had advised his clients that, having regard to the fact that other provisions in the Bill were of great importance to the public, they should go on with it. At the same time, he did not abdicate the arrangement with the Board of Trade, who he was sure intended that all the undertakings were to be acquired at the same time. Since the adjournment a report from the Board of Trade had been handed in, and the Committee would see that it was stated there that the Board of Trade considered it was desirable that the powers of purchase vested in the local authorities should be placed in the hands of the L.C.C., if they were agreed upon as the purchasing authority. Counsel then proceeded to hand in the clauses, which he considered met the views of the Committee when they gave their decisions, and the Committee adjourned.

Tuesday, November 24th.

After reference had been made by Counsel to the death of Sir Ralph Littler, Mr. Balfour Browne called Mr J. B. Braithwaite, who gave evidence as to the clause put in by Counsel on Friday, and said that the effect of Clause A was to substitute the L.C.C. as the purchasing authority of the electrical undertakings in London. At an interview with the President of the Board of Trade, the companies agreed to that provision, and also that the terms of acquisition were to be the Act of 1888 and "equitable terms." Mr. Freeman objected to evidence concerning an interview with the Minister of the Crown. Mr. Braithwaite continued his evidence, and was followed by Mr. W. E. Fladgate, Chairman of the Charing Cross Co., and Mr. J. Conacher, manager of the Metropolitan Electric Supply Co., and the Committee adjourned.

(To be continued.)

INTERNATIONAL REFRIGERATION CONGRESS.

By R. BORLASE MATTHEWS.

So great has been the advance of the refrigerating industries during the past few years, that some little while ago it was decided that the time was ripe for holding an international congress. Paris was chosen as the place of meeting—partly, no doubt, on account of the

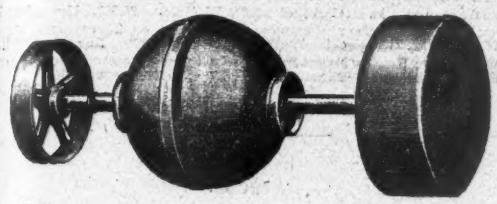


Fig. 1.—A Simple Refrigerating Machine.

great assistance the French Government has given and is giving to the industry. This congress commenced on October 5th and concluded on October 12th, the meetings being held at the Sorbonne. It was specially noteworthy on account of the very large attendance, delegates being present from all parts of the world; over 3,000 persons attended the opening meeting, which was presided over by M. Ruau, the French Minister of Agriculture.

A speaker likened the refrigerating industry to the electrical, pointing out how it was rapidly becoming a factor in every day life, its value in the preservation of food and its use in cooling places in hot weather being now appreciated in private residences, as well as in the large hotels and in the butchers' shops, as distinguished from the frozen and chilled meat storage houses. This speaker in his exaggerated comparison is, of course, very wide of the mark, but there is a fact that is well worth bearing in mind by the managers of electricity supply undertakings, and that is, that this increased demand for refrigeration means, or should mean, an increased output of electrical energy; for the refrigerating apparatus must be driven by an engine or motor of some kind, and the electric motor is most suitable for this work, especially as in many instances the automatic starting and stopping of the plant can be so effectively controlled by electrical means accordingly as the temperature of the refrigerating chamber rises or falls. In America many small central stations are adding refrigerating plants to their equipment

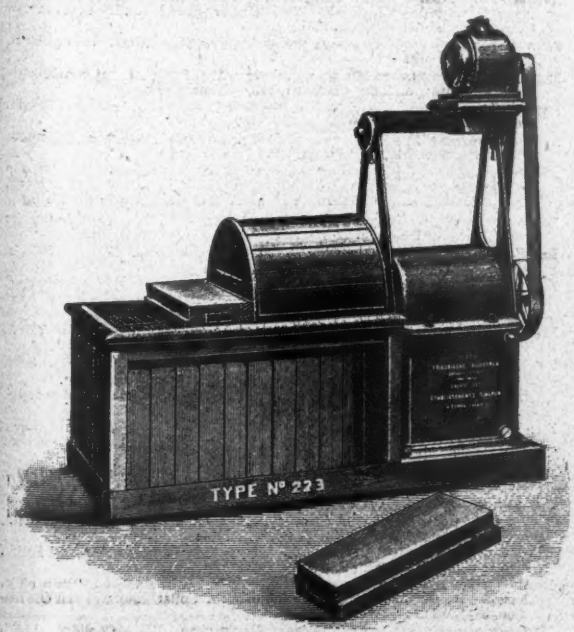


Fig. 2.—Refrigerating Machine Mounted in Connection with a Brine Tank.

as a profitable source of income, to make good the loss occasioned by the lesser demand for energy to be used for lighting in the summer time.

What, perhaps, will be the most important outcome of the meeting of this Congress, is the decision to appoint a special committee to standardise refrigerating measures. At present, refrigerating units are rather of the rule of thumb order, for while it is interesting to know that a cold store has machinery and capacity for taking care of so many carcasses of sheep, this does not shed much light upon the factor that must be employed to multiply or divide by, to estimate the number of kegs of butter the same store could contain. Among other matters that will be defined are the "efficiency" and the "useful effect" of refrigerating machines.

Over 150 papers were presented at the Congress, which for the purpose of discussion were divided into six sections, as follows:—(I) Low Temperatures; (II) Appliances; (III) Application to Food; (IV) Application to other Industries; (V) Transport; (VI) Legislation. These papers did not contain anything essentially new, but rather summed up the present position of the industry, affording a good basis for discussion, and indicating a point from which papers at future congresses would be expected to start. From an electrical point of view they were not of special interest, except in so far as they suggested applications of refrigeration which could be brought to the attention of florists, fishmongers, butchers and others, by a central station, with a view to inducing them to install electrically-driven plant.

A small exhibition was held in conjunction with the congress, and amongst the exhibits was one that should especially appeal to central station managers as a means of encouraging a further consumption of energy; it consisted of what is, perhaps, at the moment the

Fig. 3.—Refrigerating Machine Mounted in Connection with a Refrigerating Chamber.

simplest refrigerating machine made, as there is no waste or leakage from it, no acids or chemicals to be added, no adjustments to make. The apparatus consists of a spherically shaped chamber, known as the condenser or compression compartment, mounted in the middle of a hollow shaft. At one end of the shaft a pulley is fitted, and at the other a drum-shaped vessel (connected to the condenser through the hollow shaft), which serves as the refrigerator. Of course, the condenser contains a small compressing cylinder, which is ballasted or weighed, so that though hung on the shaft, it remains in a vertical position, the piston being operated by a crank on the shaft.

This combined arrangement of shaft, condenser and refrigerator is mounted in bearings and rotated by an electric motor, the condenser being partly immersed in a tank of cooling water; the refrigerator is either partly immersed in another tank of water if it is desired to make ice, or in brine, if blocks of ice are required to be made in moulds; or it is placed in the upper part of a refrigerator chamber and used in this way to keep the contents at the right temperature.

This apparatus is especially suitable for florists, hotels, provision merchants, fishmongers, butchers, &c., many of whom would be only too glad to install such apparatus if it were brought to their notice.

A visit was paid to the huge generating station of the Société d'Electricité de Paris at St. Denis, which was described in the Electrical Review of Jan. 11, 1907. The total capacity of the plant installed at this station is now nearly 100,000 h.p. Brown-Boveri steam turbo-alternators are employed, to the exclusion of reciprocating steam-power generating plant; the capacity of the main sets, of which there are ten, is 6,000 kw. each, designed for a maximum load of 7,500 kw. The station is very well arranged and exceptionally clean. It is quite new, the first portion having only been put into operation in 1905.

Electric Time Service.—As an illustration of the growing appreciation of uniform and accurate time-keeping, we may mention that the Synchronome Co., who recently extended their premises at 32 and 34, Clerkenwell Road, have large installations of electric clocks in hand at the present time for the following premises Messrs. Selfridge & Co., Ltd., New Buildings, Oxford Street Lloyd's, Ltd., and *Daily Chronicle*, Fleet Street; Royal National Orthopædic Hospital, Nurses' Home and Out-Patients' Department St. Bartholomew's Hospital.

NEW PATENTS APPLIED FOR, 1908.

Compiled expressly for this journal by W. P. Thompson & Co., Electrical Patent Agents, 322, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

23,919. "Improved code for telegraph and night signalling." B. R. Claydon. November 9th.

23,929. "Improvements in and relating to clockwork-operated electric switches." H. Gouldson. November 9th.

23,930. "Improvements in electrodes for use in electrolysis." C. C. Connor, J. W. Stubbs and The Electrolytic Alkali Co., Ltd. November 9th.

23,963. "Improvements in and relating to alternating current commutator machines." Siemens Bros. Dynamo Works, Ltd. (Siemens-Schuckertwerke G.m.b.H., Germany.) November 9th. (Complete.)

24,008. "Improvements in primary electric cells or batteries." A. Heil. November 9th. (Complete.)

24,013. "Improvements in electric burglar alarms." B. Trautmann, née Sprie. November 9th. (Complete.)

24,025. "Electric automatic call-check register for telephones." A. C. T. MacCarthy. November 10th.

24,030. "Improvements in the control of railway traffic by means of the block telegraph system of signalling." W. R. Sykes and C. J. Cooke. November 10th.

24,038. "Improvements in electric cooking and the like." J. A. Abbott. November 10th.

24,046. "Electric conditioning oven for wool and other fibrous substances." H. S. Ellis and C. E. Allsopp. November 10th.

24,047. "Improvements in automatic switches especially adapted for use in charging secondary batteries." C. J. Bennett. November 10th. (Complete.)

24,052. "Improvements in electric signalling apparatus." J. H. Carstens. November 10th. (Complete.)

24,058. "Improvements in electric switches." A. P. Lundberg, G. C. Lundberg and P. A. Lundberg. November 10th. (Complete.)

24,061. "Improvements in the electric ignition of internal combustion engines." J. D. Bell. November 10th.

24,099. "Improvements in or connected with trolleys for electric tramcars." S. B. E. Ward. November 10th.

24,112. "Improvements in and relating to signalling apparatus for electric railways and tramways." G. W. Green. November 10th.

24,116. "Improvements in and relating to braking devices for electric tramcars and the like." A. W. Maley. November 10th.

24,128. "Improvements in the electro-deposition of metals." S. O. Cowper-Coles. November 10th.

24,180. "Improvements in or relating to the process of electro-plating articles of electrically non-conductive material." A. Gerbing. November 10th.

24,192. "Improvements in electric relays." F. Conrad. (Date applied for under Sec. 91 of the Act, November 15th, 1907, being date of application in United States.) November 11th. (Complete.)

24,211. "Improvements in the manufacture of incandescent light filaments." Societe Francaise d'Incandescence Par le Gaz (Systeme Auer). (Date applied for under Sec. 91 of the Act, November 12th, 1907, being date of application in France.) Application for Patent of Addition to No. 19,720/08.) November 11th. (Complete.)

24,212. "Improvements in the manufacture of incandescent electric lamp filaments and in apparatus therefor." Particulars same as 24,211.

24,222. "Safety catch for electric tramcars." A. Gollnick. November 11th.

24,224. "For secondary batteries an improved process of manufacture of plates and the product thereof." L. Fiedler. November 11th. (Complete.)

24,241. "Improvements in or relating to electric ignition devices for explosion engines." Societe d'Electricite Nilmelior. (Date applied for under Sec. 91 of the Act, December 16th, 1907, being date of application in France.) November 11th. (Complete.)

24,259. "Construction of lightning conductor for thatched buildings." J. A. Christensen. (Date applied for under Sec. 91 of the Act, November 11th, 1907, being date of application in Denmark.) November 11th. (Complete.)

24,273. "Improvements in connection with motor-change speed-gear ignition and starting devices for internal combustion motor vehicles." C. Hamilton. November 12th.

24,280. "Improvements in automatic electrical signals on colliery machines and the like." H. Clark. November 12th.

24,296. "Improvements in electrical prepayment meters, part of such improvements being application to other purposes." S. H. Holden and Chamberlain & Hookham, Ltd. November 12th.

24,330. "Improvements in telephone exchanges." Siemens Bros. & Co., Ltd. (Siemens & Halske Akt.-Ges., Germany.) November 12th. (Complete.)

24,348. "Improvements in and connected with the sheathing of electrical wires." J. J. Rawlings, H. W. Handcock and A. H. Dykes. November 12th.

24,355 "Improvement in fluid or liquid depolariaers for electric batteries and general electrolysis." G. Schauli. (Date applied for under Rule 18, July 9th, 1908, an invention comprised in application No. 14,609, dated July 9th, 1908.) November 12th.

24,356. "New or improved depolariser for electric batteries." G. Schauli. (Date applied for under Rule 18, July 9th, 1908. An invention comprised in application No. 14,602, dated July 9th, 1908.) November 12th.

24,416. "Improvements in the electrical ignition systems of internal combustion engines." J. D. Bell. November 13th.

24,467. "Improvements in electro-galvanising apparatus specially applicable for galvanising rods, tubes or the like." G. A. Beckett. November 14th.

24,529. "Improved guard for the overhead contact roller of electric tramcars." O. Kutscher. November 14th. (Complete.)

24,532. "Improvements in and relating to electrical wiring." J. S. Highfield. November 14th.

24,521. "Improved tool for severing the hard metal sheathing of electric conductors." J. J. Rawlings, H. W. Handcock and A. H. Dykes. November 14th.

PUBLISHED SPECIFICATIONS.

Copies of any of these Specifications may be obtained of Messrs. W. P. Thompson & Co., 322, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1907.

Method of and Apparatus for Controlling Electrical Circuits. A. J. Boult (J. L. Woodbridge, United States.) 22,719. October 15th.

Electrical Indicating Thermometers. Nalder Bros. & Thompson, Ltd., and F. H. Nalder. 22,860. October 16th.

Method for Transferring Electric Energy of any Desired Kind into Direct Currents of any Desired Tension. A. Lotz. 23,144. October 19th. (Date applied for under International Convention, October 20th, 1906.)

Apparatus for Purifying Electrolytes. S. O. Cowper-Coles. 23,145. October 19th.

Electrodes for Arc Lamps. Deutsche Beck-Bogenlampen Ges. 23,215. October 21st. (Date applied for under International Convention, October 20th, 1906.)

Protection of Electrical Circuits. C. C. Garrard and Ferranti, Ltd. 23,280. October 22nd.

Electrodes for Electric Arc Lamps. E. R. Grote and Foster Arc Lamp and Engineering Co. 23,429. October 23rd.

Alternating Electric Current Distributing Systems. G. Berry. 23,433. October 23rd.

Means for Amplifying Feeble Electric Currents Applicable to Telegraphy and Telephony, and to the Intensifying of Sounds. A. von Nikoforoff. 23,441. October 23rd.

Electric Switches or Circuit-Breakers. British Thomson-Houston Co. (General Electric Co., United States.) 23,449. October 23rd.

Electric Signalling Systems. H. E. Lake. (International Telemeter Co., United States.) 23,609. October 25th.

Magnetic Brakes. E. H. Cockshott and A. W. Maley. 25,026. November 11th.

Device for Electrically Welding Overlapping or Superposed Metals. W. E. Evans. (Allgemeine Elektricitäts Ges.) 25,972. November 14th.

Manufacture of Hollow Metal Filaments for Incandescent Electric Lamps F. W. Le Tall. (A. Lederer, Austria.) 26,179. November 26th.

1908.

Sparking Plugs for Internal-Combustion Engines. R. F. Hall, 16,852. August 11th.

Armature Windings for Commutator-Electric Machines, Especially Applicable to High-Speed Machines. Phœnix Dynamo Manufacturing Co. and R. Pohl. 1,546. January 22nd.

Party-Line Telephone Systems. C. A. Soans. 2,795. February 7th.

Electric Arc Lamps. Johnson & Phillips, Ltd., and S. Paterson. 3,266. February 13th.

Electric Switches. A. P. Lundberg, G. C. Lundberg and P. A. Lundberg. 5,099. March 6th.

Manufacture of Electric Incandescent Lamps. A. G. Bloxam. (Siemens and Halske Akt.-Ges., Germany.) 5,887. March 10th.

Electric Furnaces. H. Nathusius and Westdeutsche Thomasphosphatwerke Ges. 7,188. April 1st.

Electrical Induction Clutches. A. P. Steckel. 11,186. May 22nd.

Manufacture of Tungsten Incandescence Filaments. Siemens & Halske Akt.-Ges. 11,603. May 28th. (Date applied for under International Convention, June 8th, 1907.) (Application for Patent of Addition to No. 16,489/07.)

Switch for Controlling Electrical Circuits. T. J. Rorke and E. Rorke. 12,175. June 4th. (Date applied for under Rule 13, January 3rd, 1908.)

Automatic Electric Apparatus Suitable for Advertising Purposes. A. E. Voss. 13,361. June 23rd.

Metallic Films and Process of Preparing the Same for Use with Storage Battery Electrodes. T. A. Edison. 15,862. July 20th. (Date applied for under International Convention, February 6th, 1908.)

Arc Lamp Electrodes. G. M. Little. 17,419. August 19th. (Date applied for under International Convention, September 3rd, 1907.)

Electric Conduit Junction Boxes. W. Schmahl. 17,511. August 20th.

Electrical Conduit Junction Boxes for Electrical Outlet Fittings, such as Switches, Wall Plugs and the like. W. Schmahl and A. R. Henderson. 17,512. August 20th.

Alternating-Current Dynamo-Electric Machines of the Commutator Type. Allgemeine Elektricitäts Ges. 18,372. September 1st. (Date applied for under International Convention, September 21st, 1907.)

Process for Packing Metal Filaments for Glow Lamps. Glühlampenwerk Anker Ges. 19,169. September 12th. (Date applied for under International Convention, September 12th, 1907.)

Sender Connections for Wireless Telegraphy or Telephony. S. Eisenstein. 286. January 4th.

Electric Lamp Sockets or Holding Devices. A. J. Boult. (Benjamin Electric Manufacturing Co., United States.) 880. January 14th.

Dynamo-Electric Machines. British Thomson-Houston Co. (General Electric Co., United States.) 1,770. January 27th.

Electric Rotary Floor Surfacing, Scrubbing and Polishing Machines. W. H. Strange. 3,891. February 20th.

Manufacture of a Composition Suitable for Flooring, Floor Plates, and Plates for Insulating and other Purposes. E. Waelde. 4,847. March 3rd. (Date applied for under International Convention, April 15th, 1907.)

Electrical Ignition Devices. C. Ebner. 7,930. April 9th. (Application for Patent of Addition to No. 28,738/07.)

Electrical Firing Mechanism for Breech-Loading Guns. H. C. L. Holden. 8,595. April 23rd.

Installations for Electrically Controlling Railway Points or the like. Siemens Bros. & Co. (Siemens & Halske Akt.-Ges., Germany.) 8,993. April 24th.

Flexible Stands for Supporting Electric Lamps. F. G. Grimler and H. A. Neyland. 9,128. April 27th.

Tram Rails. J. G. Pegley, J. G. Pegley, jun., and W. J. Griffin. 9,993. May 7th.

Lighting Dynamos for Motor Cars and other Vehicles. L. Bachten and J. Gallay. 11,119. May 22nd.

Process of Producing Filaments of Chinese Ink for Electric Incandescent Lamps. K. Rittersberg and H. Rubert. 11,600. May 28th. (Date applied for under International Convention, October 30th, 1907.)

Electrostatic Machines for Röntgen Rays, Electro-Therapeutics and Space Telegraphy. F. Ghilarducci. 13,761. June 29th.

Trolley Heads for Electric Traction. G. B. Holmes and A. D. Allen. 14,480. July 8th. (Date applied for under International Convention, August 7th, 1907.)

Method of Decarbonising Filaments for Electric Metallic-Filament Lamps. H. Aron and A. Geiger. 15,079. July 16th.

Ignition Apparatus for Large Internal-Combustion Engines. Firm of R. Bosch. 15,262. July 18th. (Date applied for under International Convention, September 5th, 1907.)

Manufacture of Refractory Electric Conductors. W. D. Coolidge. 16,534. August 5th. (Date applied for under International Convention, August 7th, 1907.)

Pedestal or Socket for Poles Carrying Electric Conductors. H. Hagl. 16,775. August 10th. (Date applied for under International Convention, June 12th, 1908.)

Insulating and Gripping Devices for Electric Conductors. O. Graetzer. 17,456. August 19th. (Date applied for under Rule 13, October 28th, 1907.)

Magneto-Electric Ignition Apparatus. A. Zahringer. 18,755. September 7th. (Date applied for under Rule 13, March 30th, 1908.)

Condenser for Electric Ignition Apparatus. C. Ebner. 19,501. September 16th.

Cooling the Commutator of a Dynamo-Electric Machine. Siemens Bros. Dynamo Works, Ltd., and E. O. Kieffer. 19,891. September 22nd.